RAILROAD DIGEST

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EDWARD A. PHILLIPS, ALBERT G. GLOVER, GEORGE S. HODGINS, Editors.

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Introducing the Digest to the Reader

In the December number of the Railroad Car Journal announcement was made of the coming change in the character and scope of work of the periodical, when it was stated that the title of the regenerated journal would be "Railroad Equipment." That announcement was scarcely a week old when it became apparent that the proposed title would lead to confusion and inconvenience owing to its similarity to that of the "Official Railway Equipment Register"—a similarity that led to, and would probably continue to be the cause of the wrong delivery of mail matter, as well as confusion of identity in the minds of readers and others. It was, therefore, deemed expedient to use some other title for this periodical; and, in view of the fact that the contemplated leading feature of the publication was to be a "Digest" of railroad periodical literature, it needed but little consideration to come to the conclusion that the best possible title to adopt would be the "Railroad Digest." This name has the several advantages, from a publisher's point of view—that it is distinctive, there being nothing similar to it in the title of other railroad periodicals; that it indicates the scope and character of its work; and that it is one easy to remember—one which we anticipate will soon have a familiar sound to the railroad officials of this country and to many in other countries.

The *motif* of the journal in its new form is to cater to the needs of the busy railroad man—the official who wants to keep posted on the literature dealing with the developments of his profession, but whose time and opportunity for reading and research are proscribed by narrow and rigid limitations. It is intended that the editors of the "Railroad Digest" will do his reading for him and serve up to him once a month, in condensed form, a synopsis or digest of all the articles of interest or value in the railroad and engineering periodicals of the world. The present number of the "Railroad Digest" will give a fair conception of what is in contemplation, with the exception that the items in the current digest cover an undefined period and a somewhat arbitrary selection of subjects, whereas its future work will automatically adjust itself to cover the periodical literature of the preceding month, and to do it thoroughly and comprehensively.

While it is aimed, primarily, to be of benefit and assistance to officials of the mechanical departments, it will be borne in mind that there are matters of interest transpiring in other departments of railroad work upon which they will wish to keep posted; and the selection and classification of subjects will be made with this consideration always in mind. The variety and comprehensiveness will, it is expected, commend the "Digest" to all executive and departmental railroad men; and evidence that such is the case will be an incentive to make it cover the whole field of railroad literature. Thus will the "Railroad Digest" become an instrument of usefulness to railroad officials in every branch of the service. That it will serve its purpose as a means of saving time to the busy railroad man and as an ever convenient and responsive work of reference is fully assured by the demand known to exist for such a publication among the railroad officials of this country; and by the cordial reception given to the proposition in advance of its publication by many such men of high standing in the railroad world.

It needs but a substantial response in the form of subscriptions from the railroad men, to whom sample copies of this number will be sent, to assure the permanence and stability of the undertaking; and, if the subscriptions already received in advance, on the strength of representations made as to the publication's character and scope of work, may be taken as an indication of what it will receive on an examination of its merits, that response will be so liberal and complete as to meet all the reasonable expectations of its publishers.

Most substantial and encouraging support of the object, held in view in this departure, has already been accorded by the manufacturers of railroad supplies whose experience in advertising has prompted them to recognize that, in the "Railroad Digest" they can hang out their signs to attract the attention of railroad men in a medium which they realize will be regarded as a more necessary adjunct to the literary outfit of a busy railroad man than any other existing publication.

It is a matter of regret that the rather severe and somewhat protracted illness of our Mr. Glover made it impossible for our Eastern friends in the railroad supply business to be given an opportunity to be represented in the initial number of the "Digest." The enthusiasm with which the proposition was received in the West was another feature in the case.

The character and number of the houses represented in our advertising columns is as flattering an indorsement as any trade paper could have; and 95 per cent. of it has been awarded to us in long time contracts.

Staybolts

The use of high boiler pressure, the increase in the size of fire-boxes, and the pressure upon motive power officers to keep their engines on the road, with short intervals in the roundhouse, bring the staybolt problem very seriously to the front. The length of time consumed in making repairs to staybolts is a serious matter on all roads, but especially does it become serious on roads which are continually "short of power."

The corrugated locomotive fire-box recently patented by Mr. Cornelius Vanderbilt, which is an adaptation from marine practice, has, as one of its aims, the complete abandonment of the principle of staying plates by means of staybolts. If successful in other ways the stayless fire-box will have solved a very important problem, and will have lightened the burden of locomotive men by removing the danger, uncertainty and anxiety which is inseparable from the use of staybolts.

That an effort to find relief from the ever-present danger of broken staybolts is being made is evidenced by the number of flexible staybolts which have been and are being introduced into many boilers. The "ball and socket" is the prevailing form. That is, a bolt rigidly screwed into the inside sheet and riveted, and having a ball-shaped head held in a cupped out plug screwed into the outer sheet. This form permits the inside sheet to move up or down parallel to the outside one without risk of the bending action which slowly but surely breaks the bolt. Some forms of the ball and socket stay have been designed with a view of permitting the inner sheet to approach the outer one. This motion undoubtedly takes place, at least at the front end of the crown sheet where it joins the flue sheet; which at the time a fire is started gets hot before the roof sheet does. An article, to which attention is called in the Digest, points out the great importance of having the roof sheet in a state of rest under pressure, or, in other words, of making it the shape which it would assume if free to move in obedience to the pressure within. The theoretical form which secures this state of rest is that of a segment of a true circle. In cases where the roof sheet is not a close approximation to the form approved by theory, there must be a strain thrown upon the bolts which they are not primarily intended to bear. In such a case they are called upon to restrain the sheet in its effort to assume the theoretically correct form. The load so carried by them is an extra one, and from a certain point of view may reasonably appear as totally unnecessary. The urgency of the staybolt question renders imperative a careful consideration of any and all means to reduce the work put upon each bolt down to its very lowest terms, and to afford it an opportunity to do its legitimate work in the best possible manner.

It has been said that if it were possible to properly fasten the ends, a wire rope staybolt would be an ideal one. Mr. George R. Joughins, mechanical superintendent of the Intercolonial Railway of Canada, has just come forward with a patent for such a staybolt. Mr. Joughins proposes to make a staybolt out of good charcoal iron wire cable, having a small charcoal iron core, perhaps ⅜ of an inch in diamater. The method of preparing the wire rope staybolt is to place a ferrule over the rope at each end, and weld cable and ferrule into a solid head. The core in the center will impart to the staybolt sufficient stiffness to enable it to be threaded, and threaded so that the screw on one head shall be in as exact sequence with the screw on the other, as are the threads in the holes in the boiler when tapped out with a standard tap. The core in the bolt (which is to be left projecting out a short distance at each end) will afford a means of gripping the bolt with suitable tools both on the outside and inside of the sheets, and so permit of the bolt being properly screwed in. When the bolt is in place, the projecting ends of the core can be cut off, and the heads riveted over, the central rod being what the "holder on" can apply the "dolly bar" to. When the wire rope staybolt is in place the use of the core comes to an end. It is thought that the slender proportions of the core will not prevent the sheets from approaching each other as occasion demands, and it will not interfere with the parallel motion of the plates. In fact, if the core breaks it will in no way interfere with the value of the flexible wire rope staybolt.

It has been urged that the twisted strands of the cable will present more surface to the rusting action of the water than the surface of an ordinary circular staybolt, and that the wire staybolt would be gradually rusted away and eaten up piecemeal. The answer given to that is that bolts soon become coated with a crust, and do not rust away as a bar of iron would, when exposed to the wetting and drying action of damp air outside. It is also urged that split pins used in the throttle gear do not rust away, and no ill effects are expected from this quarter with the new staybolt. In the interests of those concerned, and, indeed, of the whole mechanical engineering fraternity on railroads it is to be hoped that the flexible wire rope staybolt for locomotive boilers will prove a success.

The Coupler and Draw Gear Question

It has been well said that an ideal kind of draw gear would be something after the style of the American continuous type, in which cars are pulled very much as if they were tags on the several links of a long chain. Modern conditions have, however, required that draw gear shall do more than merely pull. Draw gear to-day must be able to stand violent shocks due to starting and stopping. In this connection the proposition recently made by Mr. George Westinghouse is at least timely. The argument which weighs with people who do car repairs, is that the selection of a standard coupler and of standard draw gear, means the reduction of stock which has to be carried to correctly repair foreign cars. The introduction of such standards would do this to a great extent, and if the selection be judiciously made, it would automatically tend to reduce the amount of these very repairs as time went on.

It is admitted on all sides that buffing, particularly, and starting jerks in perhaps a less degree, are the things which injure draw gear, and not fair and square pulling. It is also admitted that the present styles of draw gear do not stand up well against the thousands of minor collisions to which they are constantly subjected. The consideration of the question, therefore, is not only timely but most important.

A writer, whose name does not appear, hits the nail squarely on the head when he points out in the columns of the Railroad Gazette that the adoption of a standard draw gear by the M. C. B. Association should follow the same lines as were followed by it in dealing with the coupler problem. The adoption of a principle, together with a few details, should be the initial step of the association. To adopt as a fixed standard a good, or even the best we have to-day, would, perhaps, mitigate the pressing evil, but it would shut off an enormous tide of inventive ingenuity, and would restrict the efforts of improvers within very narrow limits.

A most serious difficulty which confronts the advocates of any style of draw gear is the unfortunate method of attachment to which his draw gear has so often to submit. We mean that outside of the modern car with steel underframing the draw gear is invariably placed below the center line of the car sills.

If the principle of draw gear attachment was settled, so that the push and pull on the gear could be made to act along the center line of the sills, it would turn the attention of inventors, experimenters and thinkers in the same direction without in any way hampering them in the free exercise of their abilities. The question is a serious one, and not easy of solution, but it need not be brushed aside as impossible simply because it is hard.

Friction draw gear is good, but the twentieth century may hold for us something better. Without in any way casting a reflection on the existing forms of such draw gear, whose quality and service are no doubt excellent, there nevertheless exists a feeling that they may be bettered. There is not, theoretically, any question at all as to the proper location for draw gear of all kinds, and that is on the center line of the sills. That, at least, is a principle which may be laid down as governing future developments.

Locomotive Nomenclature

A subject for topical discussion, which might with great advantage be introduced by the Master Mechanics' Association at its next meeting, is the question of a rational classification of locomotives. Several very good and simple plans have lately been suggested. Two of them regard one side of an engine

only—in the notation. The last, and probably the best, system considers the entire number of wheels under each engine. Briefly, the first plan is to designate the number of truck wheels on, say, the left side of an engine, by a small figure, a pony truck by a small figure 1, a full truck by a small 2; the driving wheels to be designated by a large figure, and lastly the idle or trailing wheels, if any, by another small figure. Thus a ten-wheeler would be 2.3, and an English single-driver express engine, 1.1.1. Another suggestion comes from one who uses the same idea, but thinks that the trouble with the first system would be that it could not be represented in ordinary typewritten figures. To obviate that difficulty the second proposal is to use small letters for the small figures and capitals for the larger ones. With letters, the number of wheels is represented by the position of each letter in the alphabet. For example: Capital C, being the third letter, would indicate 3 driving wheels, while if preceded by small "a" would be the symbol for the well-known "mogul" thus, aC. Both these methods are good, and an improvement upon present plan of calling several engines which are alike in wheel arrangement, by arbitrary names which do not suggest the type. These proposals, for want of more definite names, may be called the piano-forte and the algebraic methods. The first may be so named because in speaking one might be tempted to pronounce the small figure in a whisper and shout out the larger one; which was a method once used by a popular lecturer to indicate to his audience the sized type used on a bill poster.

An engine of the American type would probably be a "two-two" engine which, had the notation been originated in the days of the Gilbert and Sullivan opera "Patience," would have been considered decidedly æsthetic. At the present time it would likely soon become, in the vernacular of the road, a "too-too-ter," or simply a "tooter." An Atlantic type engine would be a two-two-one engine, which certainly sounds unfair, and the evolution of the future might in time give us a sixteen-to-one engine, though it is difficult to say what kind of a standard that would be.

Under the second method a double-header consisting of a six-wheeled switcher and a consolidation might be represented as C + aD, which, to say the least, has an algebraic appearance even if it is not so in reality.

The plan proposed by Mr. Whyte, however, takes into account not one side of the engine only, but the full number of wheels. Thus under his plan an Atlantic type engine would be a 4—4—2, a Mogul a 2—6—0, an English single driver a 2—2—2, and so on. The plan is simple, and is capable of being represented by the type-writer figures, and is, perhaps, more logical, in taking notice of all the wheels, than the other systems are, though all three of them are exceedingly good and deserving of serious consideration, with a view to the adoption of one, as a standard or recommended practice of the M. M. Association, so that uniformity in nomenclature may be attained.

The Education of Railroad Men for Subordinate Positions

The paper, read by Mr. Walter G. Berg, chief engineer of the Lehigh Valley Railroad, at the tenth annual convention of the Association of Railway Superintendents, of bridges and buildings, is a most interesting and instructive paper. Mr. Berg states a fact when he says that there are three grades in the railroad service which correspond to the three well known grades in the army, viz.: the officers, the non-commissioned officers and the men. He insists upon the necessity of keeping the education for the higher grade distinct from that of the next lower or middle grade, and of affording an education which will really meet the wants of those for whom it is intended. To quote his own words: "The professions of mechanical engineering, civil engineering, electrical engineering, architecture, chemistry, metallurgy, mining engineering, railroad law, railroad finance, railroad management, railroad transportation and general railroading should embody men of the highest stamp in their respective work, enabling them to take charge of large industrial, mechanical, or railroad interests. On the other hand, let skilled labor, taken in its general sense, and the holders of subordinate positions in the railroad world be assigned their proper place and receive a corresponding education."

The strong point which he makes is that this second, or middle, class exists, and that at present there is no adequate system of education to meet its wants.

He deals with night schools, correspondence schools and other means of education which are made use of by this class, and while good of their kind do not do the work which he proposes to have done by a system which will afford a two years' course to boys who are just out of the public schools, and who have not the means or opportunity to go to college. A boy fresh from school who enters the shop, the office, or the gang, has no doubt splendid opportunities for observation and improvement, but he rarely makes much use of them, and cannot get the full benefit from what he sees and hears.

How different is the boy's case when he enters upon his railroad work, not necessarily knowing more than all those about him or bumptiously knowing too much, but with "*observing* and *reasoning* faculties *trained* and developed *prior* to entering practical life." (The italics are our own.)

Mr. Berg deals with two classes of objectors. The first, in speaking of such a system of education as that proposed, would probably say that in America, all being born free and equal, the poor boy demands the same rights as the rich man's son, and that the American people would object to be grouped into different classes of society. Whether this be true or false, the pertinent fact remains that on American railways the three grades of workers actually find employment. The college is provided for the upper class, while the middle class does not receive the education it needs prior to its absorption into the railways.

The second objector is the so-called practical man, the enemy of all book-learning who maintains that "practice can only be taught in practice." If by the word practice is meant manipulative dexterity then the phrase may have some meaning, but in the broader and wider sense it is not true. Much knowledge of a very practical nature might be acquired in a special school course, such as that which Mr. Berg proposes.

A boy so educated would begin work with some useful knowledge of the theory and the broad principles underlying the particular work he had to do. With how much more zest a young fellow would enter upon his work in a roundhouse if before he began he had some reliable knowledge respecting the scope and work of the mechanical department, some insight into the general description of machinery and locomotives, some knowledge of the names of the principal parts of an engine, and the kinds of tools used and their functions, the duties of the various employees and officers, and some familiarity with mechanical and free hand drawing. How much better his chances of success than if he went to work a veritable "raw recruit" and having, with all his ignorance, the additional task of sifting the wheat from the chaff in the mass of "information" he would get from more or less careless or indifferently informed fellow-employees.

Mr. Berg maintains that what is wanted is a "fixed permanent policy and the adoption of a special uniform system throughout the country." The schools, if established, should "be to the subordinate branches of railway work what commercial schools and so-called business colleges are to business."

Space forbids a recapitulation of the courses of study proposed for the better class of railroad labor, artisans, foremen and supervisors generally, but it is divided so that young men about to enter upon railway work could find a course of instruction appropriate to the department in which they desired to be employed. There would be, under this system, a course suitable to the accounting and auditing department, one for general railroad appliances and supply business department, traffic department, transportation and operating department, telegraphy and signal department, motive power and mechanical department, car building department, department of buildings, department of bridges, construction and roadway department and a general course, suitable for all those who desire to extend their knowledge beyond the limits of their own particular sphere.

Mr. George S. Hodgins, formerly mechanical engineer of the Locomotive Works, at Kingston, and previously, for many years, with the Canadian Pacific Railway, has become an associate editor of the Railroad Digest.

ETHICS OF THE ENGINEERING PROFESSION

By Victor C. Alderson, Dean of Armour Institute of Technology.

The work of the professional man, be he doctor, lawyer, clergyman or engineer, always bears some direct relation to well-defined fundamental principles. These principles may result from the experience of humanity, they may come from *a priori* reasoning, or they may rest upon combinations of these two. But no profession can be regarded as stable until it has such a body of well-established principles as will guide a member of the profession in determining the actual value of his work, will teach him that his calling is honorable to himself and valuable to the community, and will determine what line of action may elevate the profession and instill into him the lesson that he must do nothing to bring reproach upon his chosen profession. In a word, they give him ideals to struggle for, and to struggle for an ideal is the only method for gaining true and lasting satisfaction. Pure professional success, as distinguished from mere money getting, depends upon acting in harmony with these principles.

A trade may be distinguished from a profession in its not recognizing the importance of these basal principles. Not that the man at the bench, the machine, or the loom, does not need guiding principles in his work, but that they assume a distinctly subordinate place. The professional man must be a broader man, must have a wider grasp of relations, must have the ability to solve new complications, must be the leader, and the thinker as well as the doer. The machinist may run his machine, but the mechanical engineer understands machinery. The electrician may close the circuit, but the electrical engineer understands polyphase machinery. The engine man may open the throttle, but the railway engineer understands railroading. The engineer, whatever his specialty may be, must base his practice upon the well-established laws of nature. If he belongs to the group of the successful rather than the unsuccessful, he must have plain, practical sense, a scientific education, tact, business ability and a strong personality.

The principles which underlie the legal profession, no matter what the lawyer may regard as professional ethics in a particular case, are statutes and the common law—that is, crystallized human experience. These laws form the principles upon which he aims to decide between right and wrong, between justice and injustice, and his work, except in certain criminal cases where the facts of guilt alone are to be proved, consists largely in properly fitting each new case under some one of the numerous general cases. The two parties to a suit merely urge the application of different principles, and the ultimate reason for legal wrangles is that the fundamental principles, according to which judgment is formed, are of purely human origin; consequently, they are in a state of change, of growth or of evolution. For this reason the determination of right and wrong is difficult; the question is always debatable; the legal profession has no solid foundation on which to rest its basal principles. The witty retort of the lawyer makes my meaning clear. "That is not the law," said the judge, in answer to a claim set up by a lawyer. "It was, sir, until Your Honor spoke," replied the lawyer.

At first thought the clergyman seems to have an advantage over the lawyer. To him, "Thus saith the Lord," is as potent, in Scripture at least, as the physical laws of the universe. However, he will admit that the element of faith must enter every religious creed, and that without faith his creed would not be religious. Rev. James Freeman Clarke would never have found the materials for his "Ten Great Religions" were this not true. But the quality and quantity of faith varies with peoples to such an extent that many religious sects, violently opposed to each other, have resulted. It is true, however, that their common ground is ethical or moral; that is, their unifying principle is based on human standards and, therefore, is debatable. Consequently, the profession does not have that unfailing criterion which we are seeking.

The medical profession has a more favorable position. The physician seeks to aid nature. He can do but little more, and he is ever trying to find out just how nature will work in the particular case under consideration. He deals with organic nature, and, while he may endeavor to be strictly scientific, the complications are so great that he cannot predict the result with certainty. So many variable elements affect his diagnosis that he has no exact criterion for judgment. He is very largely a mere observer of nature's workings. Like the lawyer and the minister, his standards of right and wrong are based, though in a lesser degree, upon shifting human experience and observation. In all these cases there seems to be lacking an absolute criterion by which the professional man's work can be judged—a criterion which cannot be controverted, and serves as an unfailing guide.

In the case of the engineer the circumstances are quite different. The relation between the engineer on the one hand, and the laws of nature on the other, is unique, and differs from the relation that exists between any other professional man and nature. Unlike the geologist, who is limited in his observations to those favorable localities which nature has been kind enough to unfold for his inspection, or the biologist, who must wait for nature to act and then stand as an observer, the engineer pins nature down and forces her to answer his question. It may be only a yes or no, but it is an answer, and since he can vary his questions—that is, the conditions of his experiment, he can ultimately get the information he desires. He deals with the immutable, the unchanging laws of inorganic nature. He alone of all professional men has an unvarying criterion by which he may decide the right and the wrong, the correct and the false. He gets accurate data by which he may build his bridge, construct his dynamo, or lay out his railroad. Departure from these data means failure. Other professional men are subject only to varying human laws and human notions and so get along without ever having before them an absolute standard, but the engineer is forced to be in harmony with natural laws; his work must be absolutely truthful; his logic must be without flaw. Sophistry and ignorance are not for him. He must know, and know accurately; he must reason, and reason logically. If he does not know the stresses in his bridge, the endurance of his material, or the details of his dynamo, he cannot rank as an engineer. Nature, calmly and dispassionately, is always on guard over him. No other man in the world, I believe, unless it is the chemist or the physicist, is subject to such rigid and unceasing discipline; no man's errors are so glaringly brought to light as his. The lawyer can fall back on the plea that the judge was biased, or the jury packed; the doctor may, perchance, bury his mistakes; but the mistakes of the engineer bury him. We accept his success as natural, because it is in harmony with nature's laws; his errors are glaring, because they are out of harmony with nature. All the world sees his failures. A mere tyro can recognize a poor roadbed, defective machinery, or a dangerous bridge. The engineer has, then, for his ethics the most dignified and exalted standard; he has an absolute and unvarying criterion for truth and error; he has over him a judge who will decide with unerring swiftness that his work is a failure if he violates the law. We have found, then, the ultimate lines of distinction between the engineering profession and all other professions.

Recognizing, therefore, that the judgment of the engineer's work rests upon harmony with nature's laws, and that she is merciless in showing his weakness, that this is the most nearly absolute criterion of which we know, we can draw some deductions from these principles and see what effect such a standard has upon the profession as a whole and upon the mind and character of the individuals. Who is the final arbiter of professional eminence? In the case of the lawyer, the doctor and the minister, reputation is made and success determined by the public at large—by clients, who know, as a rule, little of real professional worth. Since the ultimate standards of judgment rest on human models, quackery is possible and all too common. In the case of medicine and law, legislation defines who shall practice, but the requirements are far too low. Legislation, however, recognizes no such profession as engineering, consequently the entire burden of maintaining professional standing rests solely upon the profession itself. Presumably, then, quackery should be more common, but the facts show that it is less common in engineering than elsewhere, for this reason—the final judgment of the success of the lawyer, the doctor, or the minister, rests with his clients, while in the case of the engineer judgment is rendered by his peers. In no other profession is this

judgment so pronounced, in no other profession is quackery so quickly discovered and held up to criticism. As a result, the engineering profession is the best educated for its work of any of the professions. True, there may not be so many stars of the first magnitude in the engineering firmament, but more emit a strong, steady light, and very few show a false light. From the nature of his work the engineer does not have an opportunity to pose before the public; he cannot be the idol of the forum. His success or failure is determined by the judgment of a most competent board of critics—his professional associates.

The distinction which an engineer most covets, and which gives him unquestioned professional standing is membership in the national engineering societies. This is obtained only after successful professional practice, and is granted by engineers themselves. No other profession demands so high a qualification for membership. In England, membership in the engineering societies takes the place of the engineering degree. In the matter of a professional degree, the engineering profession takes a lofty position. The mere fact that a man has acquired the degree of C. E., M. E., or E. E., counts for little with engineers; less than the M. D. with doctors or the LL.B. with lawyers. If obtained from a high grade institution, it gives a presumption in favor of the holder, but, in no case does it carry much weight. The engineering profession is chary of its favors and degrees; it holds that three qualifications are essential to an engineer—natural aptitude, proper technical training and successful experience. No young man, however great his ability or how thorough his training, is an engineer until he has had experience. High as these standards are, they are no higher than we should expect from a profession which has such fundamental tenets.

Every field of activity in the whole realm of nature may yield something of value to the engineer. His interests are world-wide. As man has climbed slowly up the rugged pathway we call civilization, he has needed more and more the service of the engineer. What was yesterday a theory, becomes a demonstration to-day, and to-morrow we expect the engineer to apply it for our comfort or convenience. As agencies for civilization, engineering works have been given far too little prominence. True it is that Greece has left us a priceless heritage of art and Rome a code of laws, but in the wake of the Roman armies went the engineer building bridges, roads and aqueducts, making intercommunication the easier and civilization more advanced. To-day, thanks to our railway experts, the world is smaller than ever before—and is steadily growing smaller; for distance is no longer computed in miles, but in length of time in transit. Once New York and Liverpool were three months apart, now less than a week. With the aid of bridges like the St. Louis, the Brooklyn and the Forth; tunnels like the Mersey, the Sarnia the St. Gothard; canals like the Manchester and the Suez; trains like the Limited and the Empire State Express, the engineer has done noble work for advancing civilization by making intercommunication easier and removing that ever recurring obstacle—ignorance of other peoples. The influx of people to the large centers of population has brought forward new problems, not only of travel, but of pure water supply, disposal of drainage, public health, all of which the engineer is called upon to solve. Industrial history may be dry reading, because it does not fire the ardor with thrilling deeds on the field of battle. Some enthusiasm may be kindled over the success of Robert Fulton with his steam engine and Edison with his phonograph, but little or none over the success of John A. Roebling in building the Brooklyn Bridge, or the struggle of our civil engineers to make our present railway travel fast and safe. But to the engineering profession as a whole we must grant the credit for being the greatest practical civilizing agent we have.

From the principles underlying the profession of engineering only one result can flow as a guide to what is, in a narrow sense, termed professional ethics or the guide to professional conduct in particular cases. Whether the relation is with the employer, the client or the public, the ideals of the profession are high and well maintained. Men in other callings get wide experience, great learning and national reputations. Their opinions are sought after, and they frequently get into the dangerous condition of thinking that their opinions are of weight merely because they are their own opinions. The engineer, however, is daily and hourly trained by nature to know that his opinions are worthless unless they are carefully deducted from authentic data. Naturally, then, we get sounder and more mature judgment from engineers than from any other class of men; we find less conceit in them, and more straight thinking from accurate data to logical results. Like other professional men the engineer has his clients whose interests are his own. Honor and duty, therefore, are essential to his success, and become so much a part of his professional equipment that he does not talk about them. The reputable engineer takes for granted that he must love truth and truth only; that he must have a direct purpose; that he must be devoted to his work, and that he must be guided only by the loftiest standards of conduct. All this comes from the exacting requirements which nature puts upon him. Consider the responsibility attached to the engineering profession. In matters religious a man selects his own church, his own minister. In time of sickness he chooses the physician who shall attend him. Should he be sued, he selects a lawyer to defend him; but, if he rides on a railroad train, does he select the superintendent of motive power, by means of whose professional skill his journey is made in safety? Are the future users of the new East River Bridge, between New York and Brooklyn, consulted in the selection of the civil engineers who are to construct the bridge? The trust which the public has in the engineering profession lays upon it a heavy obligation—greater than upon any other profession. For this reason the engineer does not rely upon superficial observations. It is a peculiar trait of human nature that the wish is father to the thought. If, then, observations prove to be as we wish them, we are not apt to be critical; but, if they give undesired results, we examine them again with great care. The true engineer is as cautious with favorable as unfavorable data. If he is called upon to make a report, he should make it with the utmost frankness, even though it may displease a client. A proper regard for his own professional standing and the dignity of the profession at large demands that the engineer should hide nothing from his client; doubts as well as favorable facts should alike be submitted. Honesty and truth, then, follow as a natural consequence of his ideals. He need not make special effort to be truthful, for his work follows so closely upon the truths of nature that departure means failure. Every hour and every minute he is trained to truth and honesty. They form an ingredient of his daily tasks, and, unconsciously to him, influence his character. The unchangeable laws under which he works, and which he must rigorously apply exert a constantly elevating influence upon him. His work is to control, to resist, or to guide the forces of nature. If his data are correct and his reasoning is sound, his finished work stands as permanent evidence of the fact; but, if his data are incorrect or his reasoning is faulty, the merciless laws of nature will discover and lay bare to every observer his own incompetence. These very qualities of mind and character, which caused him to choose the engineering profession, and which make his work a pleasure, combine to bring his entire work into harmony with the laws of the universe. If his mind and character are not attuned to the laws of the universe, if he is not guided by strict adherence to facts and logical deductions from them, and his ethics are not in harmony with right doing and clear thinking, then he is to that extent not skilled in the application of the forces of nature to the uses of man, and is not an engineer.

Extravagance is a fault of which no true engineer is guilty. One of the greatest claims the engineering profession has upon the respect of the public is that it works constantly and persistently to increase efficiency, to reduce cost, to convert what is harmful or useless into sources of wealth, and to avoid waste. Numerous are the examples which might be cited to maintain this assertion, but they are needless.

One other consideration which results from fundamental principles should be noticed, even though it is purely intellectual. The psychologist recognizes the faculty of constructive imagination, which is not merely the reproduction of images previously obtained, but the re-arrangement of these in new forms, adapted to new purposes. This is the intellectual work of the engineer when he designs a new engine. His drawings are but the language by which he communicates

his ideas to the workman; they embody the object in every detail which he has mentally formed by his power of constructive imagination. The man who does not possess this intellectual faculty can never be a successful engineer.

In conclusion, I am willing to grant that, in the minds of many laymen, engineering is not regarded as a profession, but as a refined trade or a business; yet I am confident that, if the advocate of engineering as a profession is given a fair hearing, he can easily prove his case. I have claimed that the effect of the engineer's work upon civilization has been very great, greater than most persons realize; but the claim must be made upon the reason rather than upon the feelings, and consequently is more slowly granted; but calm, dispassionate historians will place the credit where it justly belongs. The effect upon the mind and character of the individual engineer, due to the principles which underlie the profession, cannot be easily estimated, but I am confident that if the lives of our prominent engineers could be unfolded to the public gaze, they would show in abundance those qualities of honor, honesty, integrity and manliness which naturally follow from intimate association with nature's inexorable laws.

THE UNNECESSARY WASTE OF REVENUE IN HANDLING CARS ACCORDING TO INITIALS

By J. R. Cavanagh, Superintendent Car Service, C., C., C. & St. L. Railway.

No one who has traveled around the country on our railroads, and has been at all observing, could avoid noticing the movement in opposite directions of empty freight cars of similar class, size and capacity. This is caused by the present method of handling of cars by initials, marking or ownership. It is one of the principal causes for such small earnings in car mileage of railway equipment; also of the large empty mileage on some lines. Such handling also increases the expense of switching at large terminals and at storage points. Increased switching means more expense in wear and tear on track and equipment.

Under existing custom foreign cars must arbitrarily be moved toward "home," so that in many cases we see cars of similar size and class moving in opposite directions account of this "home movement."

Illustration: The "Big Four" Railroad receives a large volume of business, such as coal, coke and high class merchandise, from the C. & O. Ry. at Cincinnati, for Chicago. There being no return C. & O. loading, these cars are on hand empty at Kankakee, where the business is all for Cleveland and Eastern lines. The "Big Four" receive a large westbound high class merchandise and hard coal loading at Cleveland for East St. Louis in Eastern "line" cars. There is no Eastern business in sight, but a large amount of C. & O. business. We are thus confronted with the situation of having C. & O. cars at Kankakee, 300 miles from points where cars are needed for "home" loading; while at St. Louis we have the Eastern "line" cars and the Eastern loading 250 to 300 miles off, thus forcing us to exchange the empties by a long haul in opposite directions over the same track—a profitless piece of business. Why not load the C. & O. cars East and the Eastern cars C. & O.? The present unbusiness-like methods of handling cars as per initials interferes. Imagine, if you can, similar conditions in banking business. "A" would loan "B" five silver dollars and demand the individual dollars returned in payment of the loan.

It has been suggested by some, in the case above cited, that we load the C. & O. cars to Indianapolis, and the Eastern cars to same point and transfer. This takes track room, switching, cost of transfer, wear and tear on tracks, power and equipment, and retards the movement of the traffic and the cars, making a maximum service impossible under such conditions.

In 1895 and 1896 I took a great deal of time to study the loss to roads or car owners caused by cars being stopped at junction or transfer points for transfer, account of owners or others not wishing cars to go beyond such points. From the best information and a very conservative figuring it must amount to over $25,000,000 per annum for the entire country; and these figures do not include anything for foreign and empty mileage, increased repairs, etc.

Some of your readers can no doubt recall cases where they "rode local" and saw the crew get an order to pick up a designated car at some out of the way gravel pit or storage track. After switching from one to two hours, they finally "dug out" the required car, whereas, the first car on the track was the same size, capacity, etc., as the one called for, but of different initials or ownership.

Several plans have been suggested. The per diem seems to take with the majority, but this may not decrease, on the contrary, it may increase expenses of car movement if carried on under present methods of "handling cars by initials."

The exchange plan of car for car, or "legal tender," or the pooling of freight cars will bring about an improvement or relief from present car shortages. There are more freight cars in the country to-day than necessary to care for the business, if handled under proper methods. No plan will succeed unless based on the owner and user participating in the profit or loss of car movements.

SKIPPING TESTS OF AIR BRAKES

By Richard A. Smart, Associate Professor of Experimental Engineering, Purdue University.

The tests herein described were undertaken to secure some additional information as to the conditions under which the emergency feature of the quick action air-brake will skip cut-out cars. The practice of cutting out cars on which the air-brake equipment is inoperative for any cause is a common one, and it often happens that such cut-out cars may be distributed throughout the train in groups of two or more. It is desirable that this practice shall not prevent the use of the emergency feature on the cars behind the first group of cut-out cars. Further, if the cut-out cars are grouped at the end of the train, it is interesting to know how many cars may be cut out at the end before the emergency action will fail to reach the way car.

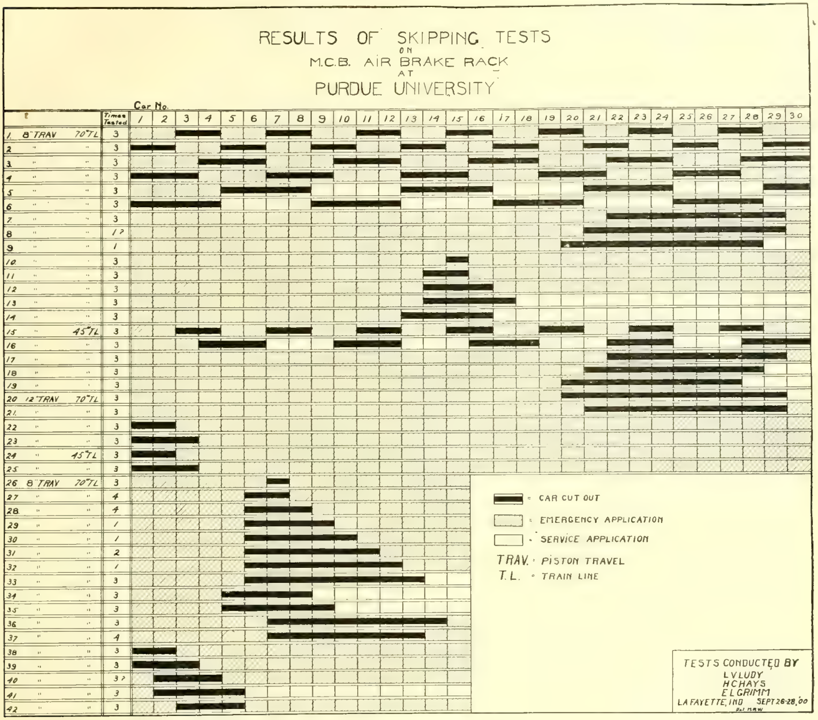
The tests were made upon the M. C. B. Air-Brake Testing Rack in the Engineering Laboratory of Purdue University. This rack consists of the air-brake equipment which would be found on a fully equipped train of fifty cars. The train pipe is fitted with the same number and kind of fittings as in service. Two sets of reservoirs and brake cylinders are provided, fifty in a set, and they are arranged in two horizontal rows one above the other. The upper set only is at present provided with triple valves, which are of the Westinghouse make.

The present tests were made with two lengths of train, thirty and fifteen cars, respectively. Except in one or two instances, the train line pressure was seventy pounds, and the piston travel was eight inches. These conditions were chosen in order to make the results comparable with certain results obtained from an air-brake instruction car.

The Master Car Builders' Air-Brake Code provides for skipping tests to be made as follows: "Application Test (c.) Commencing with the first car from the engine, the brakes of three successive cars, or less, if they fail to jump three, will be cut out until the fifth, sixth and seventh are cut out, the brakes in each case to be applied as in Test No. 2. After the first series of three has been tested, in order to test the second series the first car must be cut in, and so on. The quick action brake should pass the three cars cut out and apply on the fiftieth car in the same time as in Test No. 2. Tests will be made with piston travel of four inches.

"In addition, at least two other applications shall be made with three successive triples cut out in any portion of the rack beyond the fifth car."

In the tests of triples made in 1893 by the M. C. B. committee, of which Mr. G. W. Rhodes is the chairman, and reported in the 1894 M. C. B. proceedings, the various triples under test were only tested for the requirements of the code, which is that the quick action must pass three successive cars cut out from the front as far back as the fifth, sixth and seventh triples. Beyond this the committee did not go for want of time. But one of the triples tested exactly ful-



filled the requirements of this test although several came near doing so.

The tests herein described were intended to carry the investigation beyond the limits set by the code and determine the extreme limits to which cars may be cut out under various conditions. The results of the present test are shown by the diagram. The vertical divisions numbered from 1 to 30 represent the successive cars of the train. Each horizontal division represents a test or group of tests. Cars cut out are represented by heavy black lines. Cars on which the quick action took place are cross-hatched, while cars on which the quick action failed to take place, or on which only a service application was obtained, are represented by blank spaces. In the vertical columns at the left of the diagram are shown, first, the conditions under which the several tests were made, and, second, the number of times each was repeated.

In the first six tests, alternate groups of cars were cut out, beginning with two in a group. The emergency action passed throughout the train with alternate groups of two and three cut out. It should be noted that this action took place when cars Nos. 1, 2 and 3 were the first group cut out as well as when Nos. 4, 5 and 6 were the first to be cut out, although a considerable length of train pipe, corresponding to the tender, interposed between the engineer's valve and the first car. The tender brakes were cut out. The emergency failed to pass alternate groups of four cars cut out.

The greatest number of cars which can be cut out immediately in front of the last car was nine. With the same number cut out in front of the last two cars, the emergency failed to skip.

In the middle of the train, no more than three cars could be cut out.

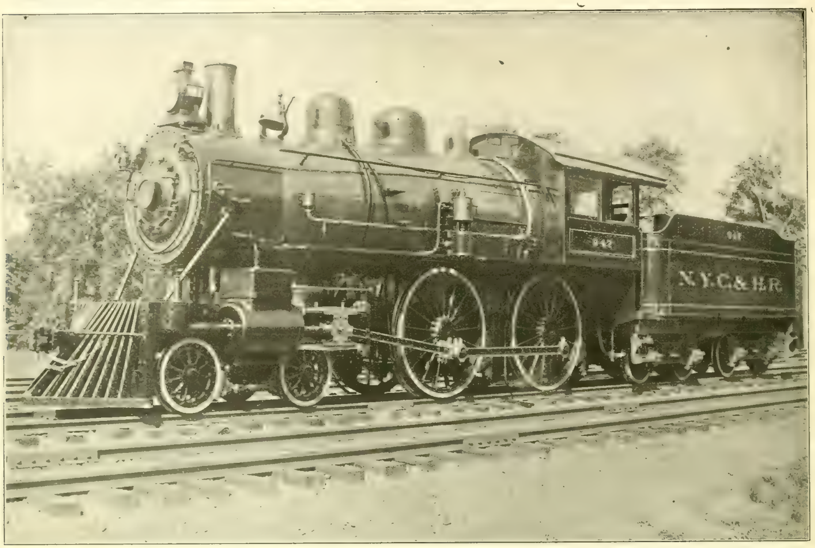
With forty-five pounds train line pressure, the number of cars which could be skipped was slightly less, as follows: Two cars alternately and eight cars at the end of the train.

With a piston travel of twelve inches, and train line pressures of seventy and forty-five pounds, the results were substantially the same as with the 8-inch piston travel and seventy pounds pressure.

With a 15-car train, a maximum of three cars at the front and eight cars at the end of the train could be cut out.

In explanation of the fact that more cars can be cut out at the end of the train than in the middle or near the front, it should be said that as the wave of decreasing pressure due to the emergency application passes a number of cars cut out in the middle or front of the train, the sharpness of the drop in pressure is greatly modified by the forward rush of air from the back end of the train line. Consequently, when the cut-out cars are near the back end of the train, there is no such flow of air tendency to equalize the train line pressure, and hence more cars may be cut out without destroying the emergency feature on the last car.

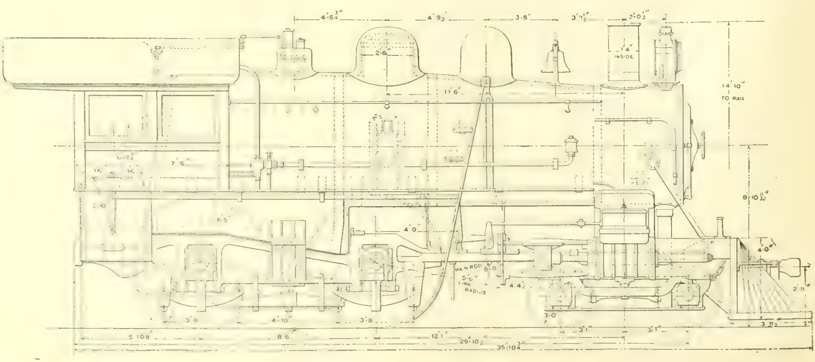
Experiments are now in progress on the rack having for their object an investigation of the character of the flow of air in the trainpipe with service and emergency applications, the result of which will be of interest in connection with the subject of skipping tests.

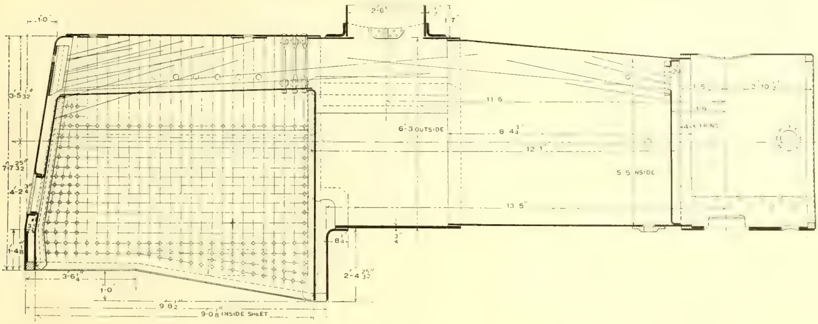


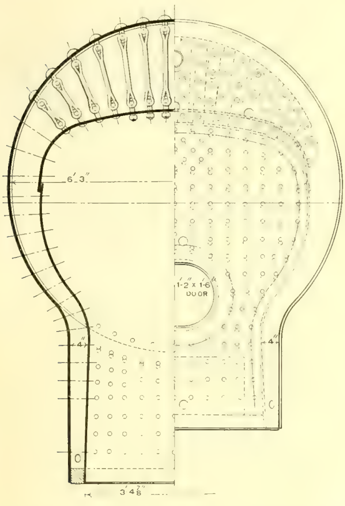
Express Passenger Locomotive, New York Central & Hudson River R. R.

The New York Central & Hudson River Railroad has recently received some new eight-wheeled express passenger locomotives for service in the hauling of the Empire State Express. There is nothing about the engines that is a decided innovation, and they are simply the results of experience gained with the locomotives previously used.

The boiler is of the extension wagon-top type with the dome set just forward of the back tube-sheet. The fire-box is stayed with bolts 1 in. and 1⅛ in. in diameter spaced 4 in. from center to center. The smaller diameter is used for the short stays and the larger for the long. The crown sheet is stayed by three rows of sling stays at the front end, arranged as shown in the engraving, the remainder being held by the 1⅛-in. staybolts already mentioned. The water legs at the sides of the fire-box taper from the bottom to the top, increasing from a width of 3 in. at the mud-ring to 6½ in. at a point on a level with the center of the shell. This secures a free circulation of water about the fire-box and an easy liberation of the steam that may be generated there. The mud-ring is slotted inside and out, and is milled at the corners to a template. All of the rivets through the mud-ring are countersunk upon the inside. The slope of this ring carries the back end up over the rear axle, and is 12 in. higher than the front. This gives a depth of fire-box of about 2 ft. 4 in. from the front end of the grates up to the bottom row of tubes. The latter are arranged in vertical rows, and are spaced 2¾ in. from center to center. The fire door opening is formed by flanging the inner and







outer sheets and riveting. The dome is held by a flanged ring riveted to the wagon-top into which the straight cylindrical sheet forming the dome is riveted. The latter is braced by a cross bar pinned to an eye riveted to the shell of the dome, as shown in the detailed engraving.

The following are the principal dimensions of the locomotive:

Total weight of engine and tender	254,400
Total weight of engine in working order	146,400
Weight on driving wheels	94,400
" " truck	52,000
Rigid wheel base	8 ft. 6 in.
Truck " "	6 ft. 2 in.
Total " "	23 ft. 8 in.
Length of connecting rod	8 ft. 0 in.
Transverse distance from center to center of cylinder	6 ft. 5 in.
Diameter of cylinder	1 ft. 7 in.
Stroke of piston	2 ft. 0 in.
Maximum travel of valve	5½ in.
Diameter of driving wheels outside of tires	6 ft. 5 in.
Diameter of truck wheels	3 ft. 0 in.
" " driving axle journals	9 in.
No. of plates in driving springs	13
Size " " "	5 in. x ½ in.
No. of plates in truck springs	14
Size " " "	4 in. x ½ in.
Spread of driving springs	3 ft. 8 in.
Total length of engine	35 ft. 10¾ in.
Inside diameter at front end	5 ft. 5 in.
" " " throat	6 ft. 3½ in.
Thickness of front course	23-32 in.
" " middle "	¾ in.
Circumferential seams	Double riveted
Number of tubes	354
Diameter of "	2 in.
Distance between center of tubes	2¾ in.
Length of tubes over tube sheets	12 ft. 1 in.
" " fire-box at top	8 ft. 1 in.
" " " " bottom	9 ft. 0⅛ in.
Width " " " top	5 ft. 1 in.
" " " " bottom	3 ft. 4⅞ in.
Depth " " " back	5 ft. 7¾ in.
" " " " front	6 ft. 7¾ in.
Water space, side of fire-box	3 in.
" " front "	4¼ in
" " back "	4 in.
Diameter of dome	2 ft. 6 in.
Steam pressure per sq. in.	200 lbs.
Grate area	30.7 sq. ft.
Heating surface in tubes	2,224 sq. ft.
" " " fire-box	180.1 sq. ft.
" " total	2,404.1 sq. ft.
Inside diameter of stack	1 ft. 4 in.
Height from top of rails to top of stack	14 ft. 10 in.
" " " " center of boiler	8 ft. 10 11-32 in.

The kind of fuel used is bituminous coal.

The M. C. B. and M. M. Conventions

The thirty-fourth annual convention of the American Railway Master Mechanics' Association will be held at Saratoga, N. Y., commencing Wednesday, June 19, next, and the thirty-fifth annual convention of the Master Car Builders' Association will be held at the same place commencing Monday, June 24. Headquarters will be at Grand Union Hotel, which has made the following terms for members and their friends:

Single room, without bath, one person, $3 per day.

Double room, without bath, one person, $4 per day.

Ordinary double room, with bath, two persons, $4 per day

Extra large double room, with bath, one person, $6 per day.

Double room, without bath, two persons, $3 per day each person.

Ordinary double room, with bath, two persons, $4 per day each person.

Extra large double room, with bath, two persons, $5 per day each person.

Applications for rooms should be made to Woolley & Gerrans, Saratoga Springs, N. Y., and the Committee of Arrangements requests that the members should apply at once for rooms.

The Joint Committee of Arrangements consists of Messrs. R. C. Blackall, F. W. Brazier and H. W. Frost.

Combination Gondola and Side Dump Hopper Car, C., B. & Q. Railway

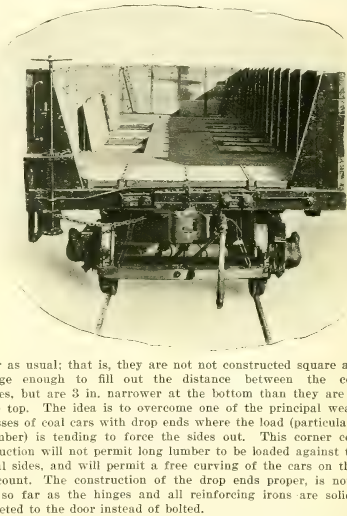
The accompanying half-tone and line engravings illustrate the 250 combination gondola and side dump hopper cars recently built by the Illinois Car & Equipment Company for the C., B. & Q. Ry. The novelty in the car is its adaptation for use as either a plain gondola, or dump car, as the circumstances may require.

The car is provided with four side hoppers, which are operated by the Johnson locking device, manufactured by McCord & Company. Each hopper can be operated separately, thus enabling the load to be dumped either on one side or the other as desired, or on both sides at the same time. About 65 per cent. of the load can be removed by opening all four hoppers. In case the gondola is intended to be used as a dump car, the trap doors remain in an open position, leaning against the coal sides. If the car is to be used as a plain gondola, these trap doors are let down into the floor, making an even floor for the ordinary uses of the gondola car. The locking attachment is particularly simple, and easy to operate. The operation of the door is as follows: Two arms pivoted together are so arranged that when the door is shut they fold over, one upon the other, until they come to rest on a stop provided for that purpose below the dead center. It is obvious that no weight on the hopper door can then raise the arms into the unlocking position. To open the door, however, it is only necessary to raise these locking arms a couple of inches over the dead center, when the door, assisted by the load, opens automatically.

The special features of the car outside of the Johnson hopper are as follows: The end sill, instead of having the high side up and down, offers the narrow side to the draw-bar, in other words, it lies flat. No tenons are provided for the longitudinal sills, the connection between the longitudinal sill and the end sill being effected by means of malleable iron sill pockets furnished by the Western Railway Equipment Company. There are three cross-ties in this car, and one of the features is that these cross-ties are not sawed off square at the ends, but are on a bevel amounting to about 1 in. per foot, the bevel starting from the bottom of the side sill and increasing outward towards the bottom of the needle beam. This has a tendency to throw the top of the side stakes resting against the needle beams inward, thus offering increased resistance to the load bulging out at the sides of the car.

Another novel feature is the much increased size of the main stakes as compared with the remainder of side stakes. The main stakes are tied by means of a ⅞-in. cross-tie rod upset to 1⅛-in. at the ends. The stakes near the transom are extended below the bottom of the side sill and braced by a double set of braces for each stake against the intermediate sill. From the intermediate sill the strain is transmitted by means of filling blocks to the center sills.

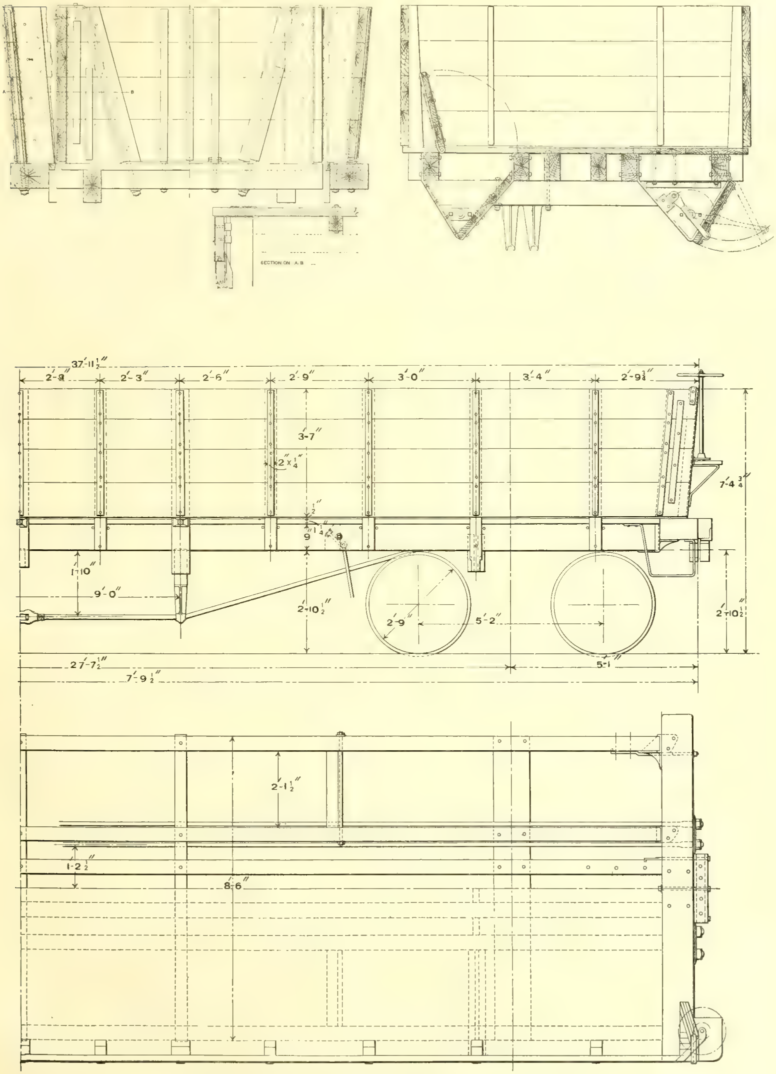
One of the most interesting features is the corner construction of the car body. The drop ends are not applied to this



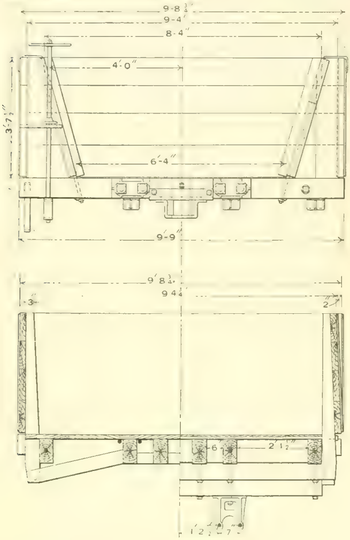
car as usual; that is, they are not not constructed square and large enough to fill out the distance between the coal sides, but are 3 in. narrower at the bottom than they are at the top. The idea is to overcome one of the principal weaknesses of coal cars with drop ends where the load (particularly lumber) is tending to force the sides out. This corner construction will not permit long lumber to be loaded against the coal sides, and will permit a free curving of the cars on that account. The construction of the drop ends proper, is novel in so far as the hinges and all reinforcing irons are solidly riveted to the door instead of bolted.

It will be noticed that the drop ends are not vertical with the car floor, but are inclined from the bottom outward about 4 in., the idea being to materially decrease the liability of the drop ends falling in toward the car when the car is empty. There is, however, an automatic latch further securing the drop ends to the corner of the car.

(See also cuts on pages 11 and 12.)



COMBINATION GONDOLA AND SIDE DUMP CAR; C., B. & Q. RY.



GONDOLA CAR; C., B. & Q. RY.

Safety Appliances

From Advance Sheets of the Fourteenth Annual Report of the Interstate Commerce Commission.

The safety-appliance act became fully effective on Aug. 1 last, the Commission having extended the time of carriers to comply with the law in respect to couplers and train brakes to that date. Railway equipment in regard to hand holds and grab irons and standard height of drawbars shows approximately perfect compliance with the statute. The Government has not undertaken to decide the coupler that shall be used, the number or location of hand holds or grab irons, the height of drawbars, or the number of cars in a train to be provided with the air-brake. These matters are all left to the carriers.

Since the law went into effect no complete or accurate information regarding accidents has been obtained. As the roads are merely required to make annual returns of the casualties to their employees, the value of the law can only be matter of conjecture for a year at least. The Commission points out that a large number of the accidents to employees can only be attributed to carelessness. Impressed with the necessity of particularly directing the attention of the employees to this subject, the secretary of the Commission addressed a letter to the subordinate branches of various railway organizations calling attention, among other things, to the need of greater care and caution on the part of railway employees in the discharge of their duties. It was also suggested that reports of accidents shall be made by the organizations to the Commission, with a view of minimizing, as much as possible, the need of resorting to the courts for enforcement of the law, and so avoiding the friction and consequent hostility which frequent litigations of this character must inevitably engender. No prosecutions under the act have yet been found necessary. In cases where it was found necessary to call attention to defects in appliances or in their operation, the railroad managers have thus far readily complied with not only the letter but the spirit of the law, and have not been inclined to cavil about the application of the statute in doubtful cases.

June 30, 1899, there were 928,924 persons employed on United States railways. During the year ending that date 2,210 of such employees were killed and 34,923 were injured in railway accidents. The number of killed and injured in coupling and uncoupling cars was somewhat less in that year than in the year preceding. Tables given in the report comparing accident statistics in 1893, 1897, 1898, 1899, and partial statistics for 1900, show on the whole some decrease in the number of accidents in 1899 and 1900. In 1893, in coupling and uncoupling cars, the ratio of killed and injured to the number employed was: Killed, 1 in 349; injured, 1 in 13. In 1899 these ratios were: Killed, 1 in 563, and injured, 1 in 22.

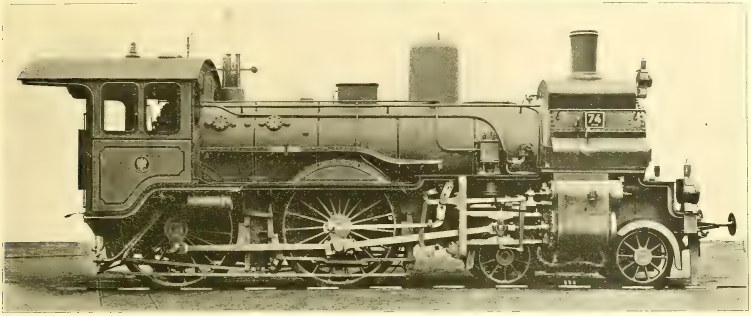
To the end that every precaution may be taken, and that no careless, indifferent, ignorant or selfish individual may be permitted to endanger his fellows, a system of public supervision should be maintained and a close inspection made of the rolling stock in service, so that no wear or breakage may go unnoticed and unremedied. It is not proposed that such public inspection shall in any respect interfere with the duties of the operating companies respecting repairs. Such inspection will require some expenditure of money—small, however, in comparison with the interests affected. Any appropriation of the public funds must be justified by the object to be attained, and here follows a comparison of expenditures made in the Life-Saving Service, Lighthouse Establishment and Steamboat Inspection Service, which are favorable to the proposed inspection on railways.

The sum of $15,000, appropriated by Congress at its last session to enable the Commission to keep informed regarding compliance with this act and to render its requirements effective, was expended mainly in the employment of competent inspectors. Their reports are not confined to failures to comply with the law. They include all such matters as tend, in their opinion, to increase the risk to employees in this hazardous service. When received, these reports are immediately transmitted to the presidents of the railroad companies concerned, and their attention called to any neglect of their subordinates in not conforming with the requirements of law or the rules established by themselves. This course has proved highly salutary, for in every case these communications have received favorable responses, while subsequent examination of the equipment has shown that the defects have been repaired, and more stringent orders have been issued by the railroad officials. The defects reported by the inspectors are summarized at some length in the report, and the failure to keep automatic couplers in proper repair is noted as a most fruitful source of accident to the men. It is observed, however, that much improvement in this respect has resulted from the system of inspection established by the Commission.

The Commission also says that any estimate of reduction in the number of accidents due to the adoption of these safety appliances must take into account the changes in conditions since 1893, when the law was enacted. At that time the average train load was about 184 tons, while in 1899 it had risen to an average of 243½ tons. The small cars and lighter locomotives then in general use have given place to much heavier equipment. Steel cars have been introduced, capable of carrying 50 tons each. The use of heavy cars and engines in the same trains with old wooden and lighter cars subjects the draft rigging and couplers of these lighter cars to unusual strain, and results in many accidents which formerly would not have occurred. Of course, the risk to the men employed in handling trains of cars of mixed capacity and greatly varying strength is much increased. This was a risk the employee was not called upon to take in 1893, when the law was enacted. The law can only reach its highest value and efficiency when all interested—the railroads, the employees and the Commission—are working to the common end of securing from its operation the greatest practical results.

Tube Railways Projected in London.

The great success of the "Two-penny Tube," as the Central London Railway is generally called, has led to quite a crop of similar schemes being prepared for presentation to Parliament. A table giving the number and mileage of the Deep-Tunnel Electric Railways within the metropolis shows three open for traffic, four authorized and under construction, seven authorized and thirteen projected new. The total mileage embraced in all these schemes amounts to 107.



EXPRESS LOCOMOTIVE FOR THE PREUSSICHEN STAATSBAHNEN.

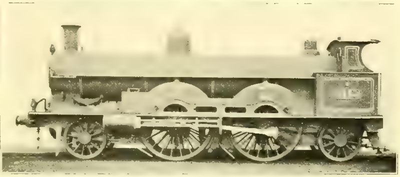
European Express Locomotives

By Frank C. Perkins.

The tendency in both European and American design of express locomotives is towards an increase in weight and size, an increase in heating surface and of steam pressure, the use of compound instead of single expansion and of coupled wheels in place of single drivers. In the latest American practice very wide fire-boxes are being rapidly introduced, this being the most marked change in recent construction.

It may be of interest to note one or two designs of express locomotives now in use on French, English and German railways. The illustration, Fig. 1, shows a four-cylinder, four-coupled, compound locomotive for express service in France designed and built under the direction of M. du Bousquet, Engineer-in-Chief of the Chemin De Fer Du Nord. The engine is built on the lines of the De Glehn compound system by the Societe Alsacienne de Constructions Mechaniques at Belfort. The speed of passenger locomotives is regulated by the governments, abroad, to a much greater extent than in this country which is practically without limitation.

EXPRESS LOCOMOTIVE, CHEMIN DE FER DU NORD.



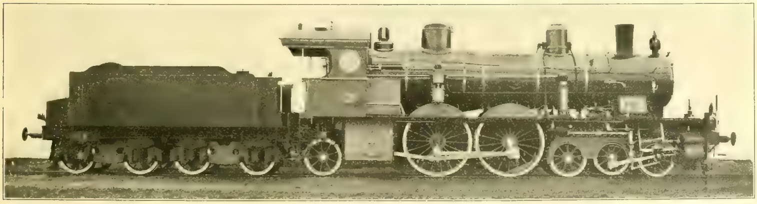
COMPOUND LOCOMOTIVE; L. & N. W. RY.

The high speeds of 80 or 90 miles per hour have been frequently attained in this country, while the speed limitations in Germany, France, Belgium and Holland vary from 55 to 75 miles per hour.

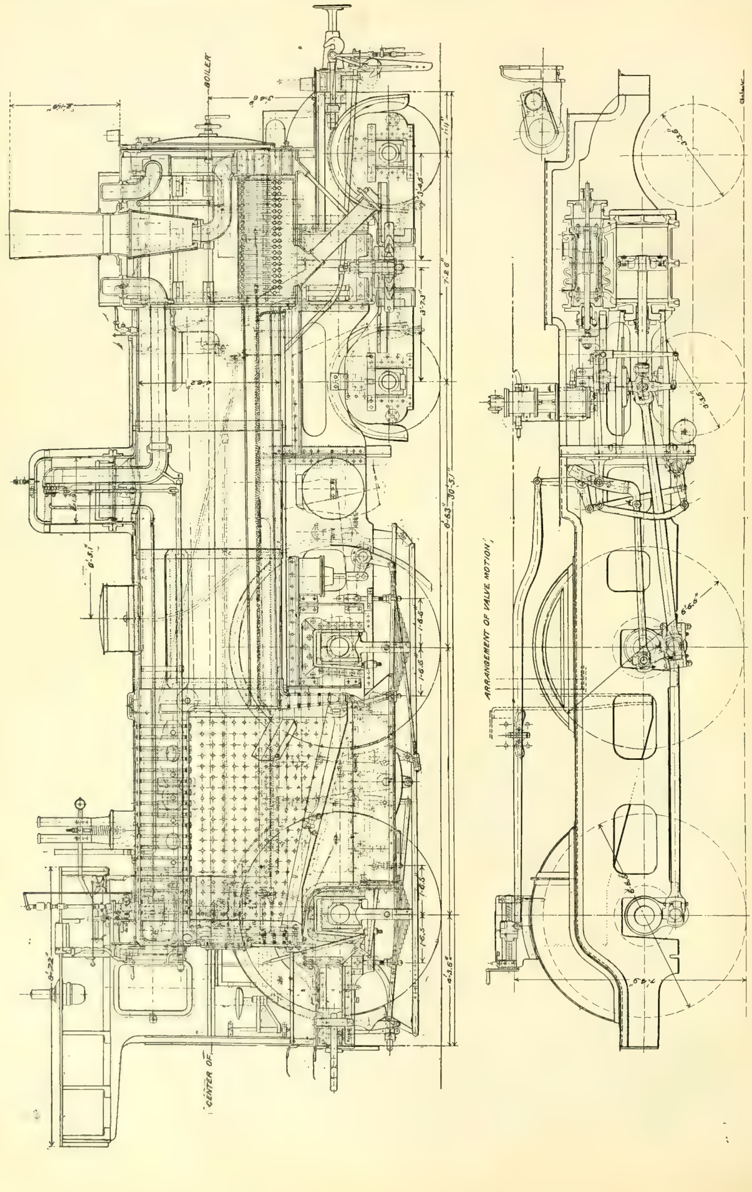
The illustration, Fig. 2, shows an eight-wheeled compound locomotive for express service built and designed under the direction of Mr. F. W. Webb, chief mechanical engineer of the London & Northwestern Railway Company. The engine was built at the company's works at Crewe. The diameter of the high-pressure cylinders is 15 in., and that of the low-pressure cylinders 30 in., while the stroke is in each case 24 in.

The driving wheels have a diameter of 7 ft. 1 in., and the fixed wheel base is 8 ft. 3 in., while the total wheel base is 23 ft. 8 in. The total weight of the locomotive in working order is 52 tons and 2 cwt. The London & Northwestern Railway Company have already constructed more than 4,000 locomotives at their works at Crewe.

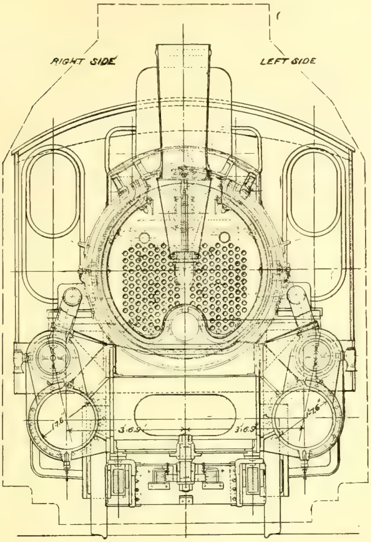
The German express locomotive shown in Fig. 3 has created considerable comment on account of its peculiarity of construction. It is provided with an auxiliary driving axle, in front; which can be lowered at will by means of a lever. It is

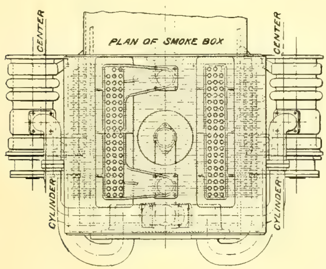


GERMAN EXPRESS LOCOMOTIVE.



EXPRESS LOCOMOTIVE WITH SUPERHEATER; PREUSSICHEN STAATSBAHNEN.





claimed that while it is a four-coupled engine it has all the advantages of the six-coupled engine when extra tractive power is temporarily necessary in starting and accelerating heavy trains or in ascending steep gradients. In such cases the auxiliary axle is pressed down by the lever, its cylinders switched in and the small engine is used as a "donkey" or as a pilot to the large one.

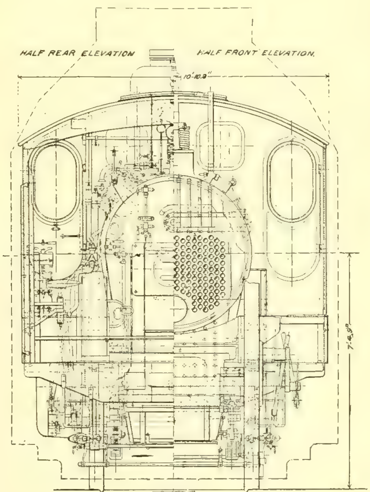
The drivers of the auxiliary engine are made very much smaller than the large ones, as it is only used at comparatively low speeds, usually less than 40 miles per hour.

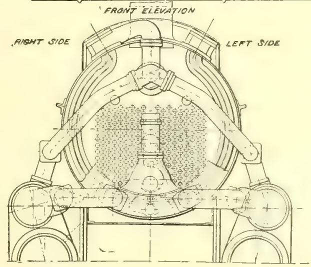
The diameter of the auxiliary engine cylinders is 260 millimeters (10.24 in.), while the stroke is 400 mm. (15.75 in.). The diameter of the auxiliary driving wheels is only 1,000 mm. (3 ft. 3.37 in.), while the wheel base of the bogie is 2,380 mm. (7 ft. 9.70 in.). The total length of this German express locomotive is 11,648 mm. (38 ft. 2.58 in.), while the total wheel base is 8,940 mm. (29 ft. 3.37 in.). The total weight of the engine is about 68 tons.

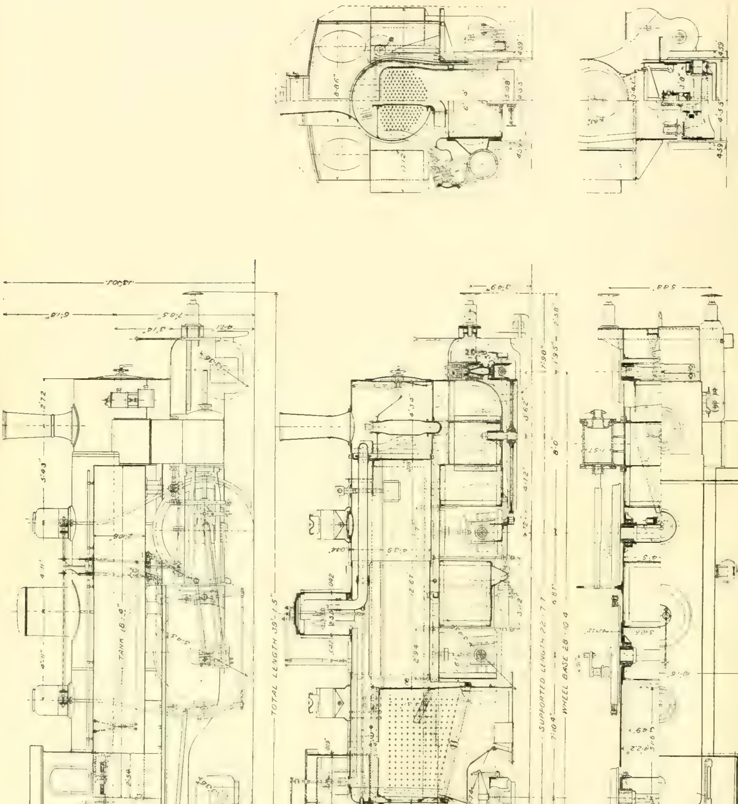
The main drivers of the engine have a diameter of 1,870 mm. (6 ft. 1.62 in.), and they are operated by cylinders 440 mm. and 650 mm. in diameter, the stroke being 660 mm., or 26 in. This engine was built by the Locomotivfabrik Krauss & Comp. Actien-Gesellschaft of Munich, Germany, for the Koniglich Bayerischen Staatsbahn. The boiler of this engine has a diameter inside the largest ring of 5 ft. 3 in., while the smallest ring has a diameter of 4 ft. 8.14 in. The total heating surface is 210.45 square meters (2,265.3 sq. ft.) divided between the fire-box and tubes as follows. The fire-box has a heating surface of 131 sq. ft., and the 238 tubes have a heating surface of 2,134.3 sq. ft. The tubes have a diameter of 47 mm. (1.85 in.) and 52 mm. (2.04 in.) and a length of 16 ft. 9 in. The boiler pressure is designated to be 200 lbs. per square inch.

The diagram, Fig. 4, gives the detailed drawings of a passenger locomotive built by the Krauss Company, and exhibited at the Paris Exposition recently closed. The cylinders have a diameter of 450 mm., or 17.71 in., with a stroke of 560 mm., or 22.04 in. The steam pressure is 12 atmospheres, or 176.4 lbs. to the square inch. This engine carries its coal and water without a tender, and has a capacity for 9.1 cubic meters of water, or 2,403.95 gallons, and 2.77 tons of coal. The tractive power is 30 tons, and the total weight of the engine is 68.8 tons.

An express locomotive of interesting construction has recently been built for the Preussichen Staatsbahnen. It was designed for use with a superheater by Banart Wilhelm Schmidt, and was constructed by A. Borsig in Tegel, near Berlin, Germany.







PASSENGER LOCOMOTIVE BUILT BY THE KRAUSS COMPANY.

The diameter of the cylinder of this locomotive is 500 mm. (19.68 in.), while the stroke of the piston is 600 mm. (23.62 in.). The boiler pressure at which the engine is normally operated is about 12 kilograms per square centimeter, or about 170 lbs. per square inch.

The superheater has 60 tubes each having an inner diameter of 30 mm. (1.18 in.) and an outer diameter of 38 mm. (1.49 in.). The heating surface of the superheater is about 28 square meters, or 301.39 sq. ft. The total heating surface of the boiler is 108.5 square meters, or 1,167.89 sq. ft.

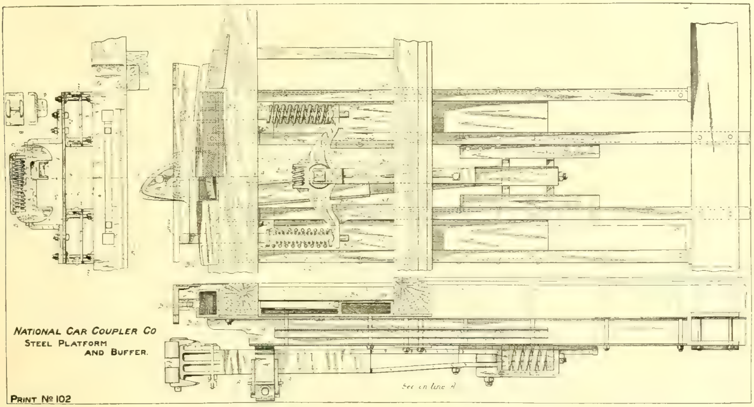
The main driving wheels of the engine each have a diameter of 1,980 mm., equal to 77.95 in., while the total wheel base is 7,400 mm., or 24 ft. 3.24 in.

The illustrations show the locomotive as exhibited at the Paris Exposition this year. From these drawings further detailed information may be obtained, and it is interesting to note the many differences in detail of construction from the standard American type of locomotive for the same class of service. The total length of the engine is about 10,000 mm., that is, 32 ft. 9.6 in., while the total height is about 4,000 mm. or 13 ft. 1.4 in. The gauge for which this engine was built is 1,360 mm. (4ft. 5.52 in.). The German engines are well constructed, and are built of the finest materials in the market.

The National Steel Platform

The accompanying illustration shows another valuable article added to the list of the new devices manufactured by the National Car Coupler Co., of Chicago, this being a steel platform and continuous platform buffer of the strongest and simplest construction. A notable feature of the platform is the web connecting the outer to the inner channels giving the platform exceeding lateral strength as well as additional strength vertically.

The principal feature of the Buffer Yoke is that it moves forward both in buffing and pulling. This is caused by a joint in the yoke that moves backward in buffing at the center, throwing the outer end of the yoke forward to arrest lost motion. In pulling, the yoke moves rigidly forward by the connecting bar to the coupler. In drawing around curves with heavy trains the outer sides of the buffer plates are kept as rigidly together as the inner sides. The use of this yoke and the absence of a center buffer spring permits the buffer plate to have a continuous even pressure all the time, keeping the cars firmly together, which is a great advantage owing to the continual shifting of positions caused by going round curves and over grades on the road. Further details will be furnished by the company upon request.



The general outline of the locomotive is pleasing in appearance, although somewhat peculiar as compared to our American practice.

As the losses through cylinder condensation are considerable it is not surprising that efforts are being made to obtain more economical results by using superheaters. An express engine on the Hanover line has been operated with a superheater with considerable success; and, considering it was the first constructed, created much interest. It was built at Stettin at the Vulcan Works. The engine shown in the illustration is the third of its kind built, and the designers hope to increase the boiler power a large percentage by its use.

It will be noted by the accompanying drawing that the machine is of the eight-wheel type, with four-wheel front truck and four coupled drivers.

The superheater, it is said, will raise the steam at 180 pressure to a temperature of 626 degrees F., and the hot gases are supposed to be reduced 147 degrees F. in passing through the superheater.

"You Can With a Can"

It is quite possible to use Dixon's Pure Flake Graphite in an ordinary squirt can—in fact, that is probably the most convenient way in which that wonderful lubricant can be applied. The only requisite is that the can must be perfectly dry. A new can is recommended for the experiment.

Interstate Commerce Commission's Library.

The Interstate Commerce Commission, at Washington, D. C., in its recent annual report calls attention to the growth and importance of the transportation library established by it in 1894. The collection now comprises 5,500 volumes and 7,200 pamphlets. The library is being steadily enlarged by the purchase from time to time of desirable publications, by donations from various sources, and by exchange with other libraries of such duplicates of books and pamphlets as have been accumulated. The value of the library is demonstrated by its constant aid to the Commission and by the increasing use made of it by students of transportation questions.

A recent issue of the Jernbanebladet, a railroad journal published in Sweden, reports that the 20 and 31 x 24 in. two-cylinder compound 10-wheeled freight locomotives, which the Swedish State Railways purchased from the Richmond Locomotive Works during 1899, are so satisfactory that the railway administration has decided to adopt the Richmond system of compounding on their lines, and have ordered 29 compound engines of that type to be built in their own shops. This is a great achievement for American locomotives, which are gradually working their way into all the countries of the world.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Locomotive Equipment and Appliances

Large Locomotive Fire-Boxes.

By A. Bement.

American Engineer and Railroad Journal, Nov., 1900, p. 346.

In this article Mr. Bement brings out some important facts on the influence on combustion of large fire-boxes, and illustrates his reasoning by several diagrams or graphic representations of the losses in escaping gases. He reminds us that the performance in the fire-box is a chemical process, and he argues that it should be examined by chemical means and methods before the size of a fire-box is laid out, rather than wait for experience to furnish the necessary data. Mr. Bement calls attention to points in favor of the wide fire-box which are important. The wide and high box gives the fireman a better opportunity to use his intelligence and knowledge in the art of stoking. In addition to the increased air supply, which a larger grate area will give, it will take a longer time for the fire to become dirty.

The Relative Advantages of Ordinary and Compound Locomotives

By Chas. E. Wolff, Practical Engineer (London), Nov. 30, 1900, p. 510.

In a paper on compound locomotives Mr. Edgar Worthington states the advantages of compounding.

1. A saving of fuel and water, due to the use and easy manipulation of steam at high pressures and large ratios of expansion.
2. A more uniform distribution of pressure on working parts when running, than in the ordinary locomotive.
3. An increased power of starting a train.

The saving of fuel is, of course, the main point. The efficiency of the marine compound is pointed to as an evidence of what might be done by a compound locomotive. But three conditions affect the land machine which do not obtain at sea. These are the variable nature of the work demanded. The wetness of the steam and the impossibility of condensing. The compound locomotive does its best work at slow speeds and with constant load, and not many stops.

Mr. Wolff shows by figures that on long, hard gradients up and down, where speed fluctuates very much, the compound cannot be expected to work economically. The effect of wet steam decreases the gain due to compounding. With simple engines only about half the water evaporated is accounted for in the diagrams, and there is no doubt that a locomotive boiler supplies very wet steam. There does not seem to be anything in the second claim of more uniform pressure on the working parts. The third claim, that of increased power of starting a train, is disposed of by pointing out the fact that nearly every modern locomotive has sufficient power to slip her driving wheels at starting, and if the compound has more power in starting a train it is not at all clear how it is to be used.

The disadvantages, briefly stated, are as follows: Probably the most serious is its want of adaptability to both light and heavy traffic. The compound must be designed for a particular class of work, and be kept at it. It is not at all suitable for trains which make frequent stops, the compound being usually a poor starter unless some special arrangements are made for use at starting. The high pressure cylinders are only available until there is some pressure in the receiver. The compound suffers also from loss by radiation, as the greater cylinder surface exposed to the air carries off more heat than it does with the simple engine. The compound locomotive, as a general thing, has this further objection urged against it. Compounding leads to an increase in the number and weight of the moving parts, and there are more glands and stuffing boxes. This uses up more oil, and brings about an increase of the maintenance charge, while the increase of the parts has caused the first cost to rise.

The remainder of the article is devoted to an analysis of the various types of compounds. The two cylinder type, those designed by Mr. Karl Gölsdorf for the Austrian State Railways, are spoken of; also the Worsdell-von-Borries-Lapage engines. In the three-cylinder class are mentioned Mr. F. W. Webb's engines on the L. & N. W., and one constructed on the Smith system working on the North Eastern Railway.

In the four-cylinder class those of Mr. Webb are referred to and also those of the Vauclain system. A brief summary closes the article.

To Improve the Headlight

Locmotive Engineer, Nov. 1900, p. 477.

The pooling of locomotives has been conducive of a certain amount of neglect of headlights by the men who run the engines, and the reflector suffers from the want of wiping and polishing. The silver coating on reflectors readily tarnishes where coal containing sulphur is used. This tarnishing effect may be made apparent to any one who carries a silver-cased watch in the same pocket with sulphur matches. Every time the sulphur and silver combine on the surface of a reflector a thin film of silver is destroyed, and cleaning the reflector simply rubs off this thin coating.

Silver is cheap enough to be put on in much thicker quantities, and so insure a longer useful life to the reflector. A correspondent, Mr. John W. Troy, suggested that the reflector be coated with white enamel, which would be easily cleaned, and would be much superior to a tarnished silver reflector.

The storage battery for the electric headlight is considered better for the locomotive, on the ground that there are so many demands on a modern locomotive to furnish steam for outside purposes, that the running of a steam driven electric generator for the lamp may prove to be like the proverbial straw on the camel's back.

Locomotive Fire Pump

Railway and Engineering Review, Nov. 10, 1900, p. 640.

A simple fire pump intended for application to locomotive tenders has been put on the market by the E. W. Vanduzen Company, of Cincinnati, Ohio. The pump works on the principle of an injector, and is so made as to be without pockets which hold water, and is thus said to be free from the danger of freezing in winter. It is claimed that the device will, when operated, fill a 2-in. hose 100 ft. long and discharge a solid stream of water from a ⅝-in. nozzle 90 ft. horizontally.

Locomotive Roundhouses

Revue Generale des Chemins de Fer, Nov., 1900.

The locomotive roundhouses of the Eastern Railway of France at Noisy-le-Sec consist of two circular buildings, each 264.6 ft. in diameter, connected by a rectangular building containing the offices, storehouse, repair shop and the necessary accommodations for employees, engineers, firemen, etc. Each house has accommodations for thirty-two locomotives, and is formed by a metallic framework that is independent of the side walls. This framework consists of 16 arches, pivoted at the base and fastened to a crown at the summit, which is 10½ ft. in diameter. The turntable is 55 ft. 9 in. in diameter, and is provided with a circular platform moving with it to prevent the ditching of the locomotive. The whole

interior of the house is free from obstruction, and the engines are headed to the outer wall, where stacks are provided for the removal of smoke. There is a direct connection from the roundhouse to the repair shops, and the tracks on the outside are arranged with the view of having the smallest possible number of switches, while they lead to the main line as well as to the sidings for coal and water.

The Black Diamond Express

Railway Age, Nov. 16, 1900, p. 387.

Trains 9 and 10 on the Lehigh Valley, which are known as the "Black Diamond" expresses, have at times reached very high rates of speed. A table furnished by Mr. C. S. Lee, the general passenger agent, is well worthy of careful perusal. The table covers too large a field for reproduction here, but may be summarized as follows: Two runs from Buffalo to Sayre, a distance of 177 miles, have been made at the rate of 63 and 62 miles per hour, respectively.

Seven runs tabulated as over 50 and under 100 miles in length, show an average speed of 63.4 miles per hour, while 29 runs, all under 50 miles, show the exceedingly high average of 75.65 miles per hour.

Lighting the Track.

Railroad Gazette, Nov. 23, 1900, p. 765.

A letter signed A. T. calls attention to an article on "Eyes and Headlights," which appeared in that paper Oct. 12. The writer advocates the use of an electric headlight, mounted like a searchlight, so that it can be turned through a suitable arc when the engine is rounding a curve. He also suggests the advisability of illuminating the track with fixed lights as streets are lighted.

Gasoline street lamps, each furnished with a tank, and fitted with a burner of the Welsbach type; or electricity supplied by a generator placed at each water tank, are mentioned as ways in which the permanent lighting could be done. Where electric lights are used, the correspondent proposes to have the approaching engine light up the section of road ahead in the same way that it now operates the block signals, and on passing each light automatically turn it off.

Water That Is Too Pure for Feeding Boilers

Locomotive Engineering, Nov., 1900, p. 463.

The water of Loch Katrine, from which the city of Glasgow receives its supply, is nearly pure. It has been found in that city to have a bad effect on boilers which are entirely free from scale; in many cases it produced serious corrosion in such boilers before its effects were discovered. To obviate this trouble lime-charged water is used until there is a slight coating formed, after which the nearly pure water does no harm.

There are districts in America where the water used for boilers is as pure as that in Loch Katrine, and, in view of that fact, the practice of the Glasgow boiler owners is instructive. Similar trouble had been experienced at sea after the advent of the surface condensers. Water evaporated and condensed in an almost continuous cycle had a similar effect to the too pure water of Loch Katrine, and marine engineers remedied the trouble by feeding direct from the sea until a slight scale had formed.

The Explosion of a Locomotive at Westerfield

The Engineer (London), Oct. 26, 1900, p. 411.

On the 25th September, 1900, the boiler of a goods locomotive, belonging to the Great Eastern Railway, exploded at Westerfield station killing the driver and fireman. The engine had just hauled a heavy train up an incline, and the safety valves, which were set at 160 lbs., were blowing freely at the time. It seems that the inside side sheet of the firebox tore away a little above the mud-ring. The whole sheet did not go, but only the central portion, about one-third of the total length. The initial fracture, strange to say, did not pass through the staybolt holes. That portion of the sheet which was liberated at the bottom, tore upward along a vertical line of rivets to the crown sheet on one side, and on the other making a diagonal line from one vertical line of rivets to another. The crown sheet was fractured across in spreading lines, so that at the side remote from that on which the first break occurred, the entire crown sheet went down. In the article there are different theories dealt with, with regard to the explosion, but the evidence seems to show that the staybolts were amply strong, although not riveted over inside or out. Riveting is said to increase the holding power of staybolts by about 30 per cent. The side sheet was pulled off the staybolts, but in the crown sheet 88 bolts, each capable of sustaining 12 tons, were broken. The portion of the crown sheet which failed required, therefore, 1,056 tons pressure to blow it down. The violence of the explosion is what the writer dwells on, which he likens to the effect of an explosion of gunpowder within the boiler. He says: "That the heated water had sufficient energy stored in it to produce such an effect is beyond question. But it would only produce it if the whole of that 'potential' energy were suddenly expended in producing an enormous increase of pressure." The writer does not think we are much nearer to the explanation of the violence of boiler explosions that we were thirty years ago. To quote once more. "The complete catastrophe points to this sequence of events: (1) A rent is made in the side of the box through which water rushes out; (2) The pressure in the boiler being reduced a portion of the water is flashed into steam; (3) This flashing process being once started, it goes on, until in the twinkling of an eye a pressure is produced great enough to tear up the fire-box, as shown in the engraving."

The analogy between the action of guncotton and heated water is pointed out. Guncotton can be burned in the open without danger. Water can be heated and converted gently into steam. Why either of them behave thus is not clearly known. Guncotton in the open can be exploded by firing a detonator placed in it. What we call an explosion is simply the exceedingly rapid transformation of stored up energy into the active form, and under certain conditions an effect is produced on heated water similar to that of the detonator on guncotton. The lesson to be drawn from this explosion seems to be that it is always well to rivet over the heads of side stays.

An Idea in Steam Gauges.

Locomotive Engineering, Dec., 1900, p. 526.

A superintendent of motive power on a trunk line in the West proposes that steam gauges on locomotives be so arranged that the figures on the dial which represent the blowing off pressure shall always be placed at the top. This would be a help to the fireman and engineer, who are not always able to read the figures on the gauge by the dim light of the gauge lamp. Such an arrangement would in no way alter or interfere with the internal mechanism of the gauge. The semaphore gauge used in air-brake work makes use of the perpendicular and horizontal position of the needle for important pressures.

Modern Locomotive Practice—Crank Axles

The Mechanical Engineer (London), Oct. 20, 1900, p. 555.

This article is by Mr. C. E. Wolff, B. Sc. He gives an illustration of the form of crank axle designed by Mr. Harry Pollitt for the Great Central Railway. The webs of the cranks are elliptical in shape, and have a band shrunk on to strengthen them. The crank pins are further secured from fracture by having tightly fitting pins driven into holes drilled through them and riveted over at both ends.

The standard form of crank axle used by Mr. Wordsell on the North-Eastern Railway has the crank webs circular. One advantage in addition to strength is that all the work of finishing can be done in the lathe. It has not been found necessary to hoop the crank webs of this design.

Until recently the best Yorkshire iron was used for this class of work, but lately the low price of mild steel has led to its being used. The change, however, has been made with much reluctance, and the writer believes that mild steel only marks the transition from wrought iron to nickel steel. This latter appears to be an ideal material for crank axles all but in point of cost. The tensile strength usually specified is from 30 to 40 tons per square inch with elongation of 28 per cent. In addition, test pieces, all of which are taken prefer-

ably from the ends of the axle and from the slab cut from between the crank webs, are subjected to bending tests. A bar 1 in. square, with corners left sharp, after being heated cherry red and quenched in cold water, is expected to stand bending through 180 degrees with an inside radius of ½ in. without showing signs of fracture even on the sharp edges. The Midland Railway require a bar 1¼ in. square, with sharp corners to bend through 120 degrees without showing signs of distress.

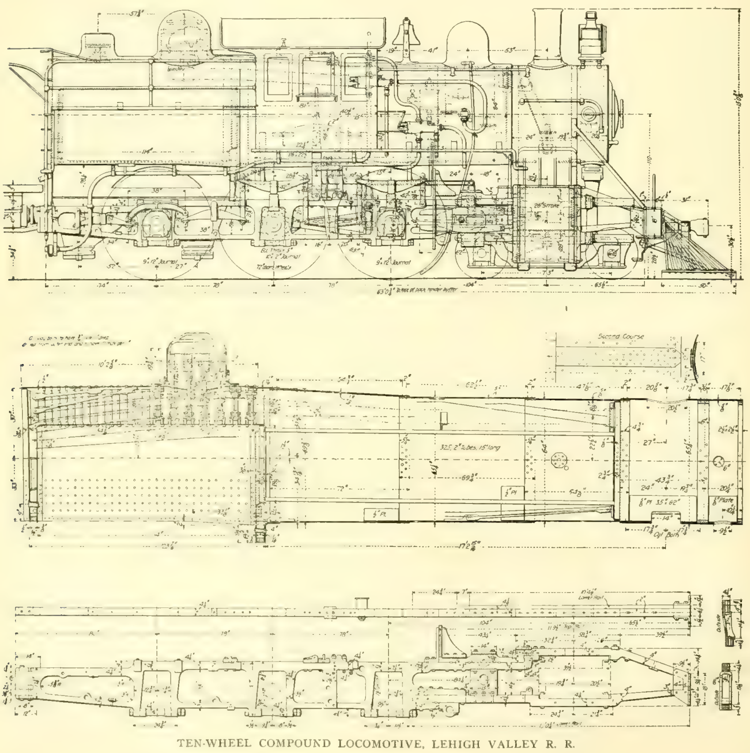
Mr. F. W. Webb, of the L. & N. W., has been using built up cranks; those referred to above were solid. The webs of the L. & N. W. crank axles are of a fat figure 8 shape, and are shrunk on to the axle and keyed as well. The web is also shrunk on to the crank pin and further secured to it by pins 1½ in. diameter screwed in at the junction of crank pin and the thicker portion of the web. The built up axles have proved entirely successful for passenger as well as freight service. As the forging in the case of the built up form is simplified the axles can be made of a harder and tougher grade of steel, the materials used being nickel steel for crank cheeks, and chrome steel for crank pins and axles. A result of this is that a somewhat lighter axle can be made. One great advantage this form of construction possesses is that the material is in compression at the points where fractures usually occur.

Heavy Ten-Wheel Compound Passenger Locomotive with Wide Fire-Box—Lehigh Valley Railroad

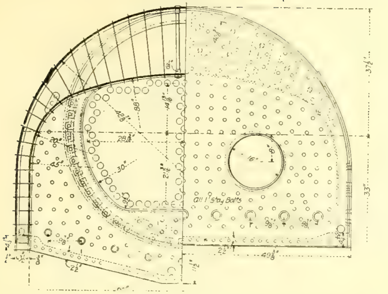
Railroad Gazette, Dec. 28, 1900, p. 854.

The design of the new Lehigh Valley passenger engine is well illustrated by a number of cuts and an inset. The Baldwin Works are building five of them. They are intended to haul passenger trains weighing 800,000 lbs., exclusive of engine and tender, between Easton and Wilkesbarre without a helper. A profile of the road between Mauch Chunk is given on the inset, and shows how very heavy are the grades and how frequent the curves of that part of the line upon which these engines will run.

The engine is a Vauclain compound with wide fire-box and 72 in. in diameter. The cylinders are 17 and 28 in. in diameter, respectively, with 26-in. stroke. The weight of engine in working order is 182,000 lbs., the truck carrying 47,000 lbs. and the remainder, 135,000 lbs., is on the drivers. The fuel is hard coal, and the pressure carried is 200 lbs. Sling stays are only used under the dome and to support the area of crown sheet immediately under the dry pipe. The fire-box is 90 x 114 ins., and the crown sheet is longitudinally straight. The crown and side sheets are made from one plate, and are therefore without seams. The total heating surface is 2,708.3 sq. ft.

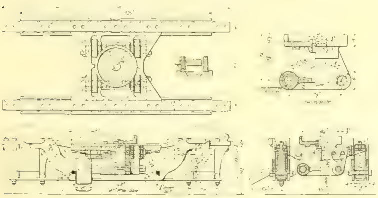


TEN-WHEEL COMPOUND LOCOMOTIVE, LEHIGH VALLEY R. R.



The frames are open-hearth steel castings. The piston rods are hollow made of open-hearth steel, and are extended through front cylinder covers. The weight of boiler used necessitated the reduction of weight of machinery as far as possible within the limits of safety so that the allowable weight on track would not be exceeded. Cast steel was therefore used extensively.

The engine truck frame is composed of two bars, with cast



steel transom, and the cradle is supported by heart-shaped "three-point" hangers, to better adapt the engine for the curving track over which it will run.

The main frame was designed with special reference to push down driver brake fixtures. The brake shoes are in rear of the drivers.

In the valve gear two rockers are used, which is the Lehigh Valley practice, when it would otherwise be necessary to bridge or go under a forward axle with valve gear.

Three-Cylinder Compound Locomotives—Jura-Simplon Ry.

Le Genie Civil, Dec. 1, 1900.

The Jura-Simplon Railway has recently had some three-cylinder compound locomotives built at the Winterthur Works in Switzerland, for passenger service over mountain grades. They have the wheel arrangement of the mogul engine, and are intended to haul trains weighing 200 tons, exclusive of locomotive and tender, up 2 per cent. grade at a speed of 18.6 miles an hour, while they are capable of attaining a speed of 45 miles an hour. The high-pressure cylinder is in the center and in front of the truck, with a connecting rod driving a crank axle of the leading pair of driving wheels. The low-pressure cylinders are upon either side and back of the truck wheels with connecting rods taking hold of crank pins in the middle pair of wheels. The locomotives weigh 55 gross tons in working order, of which 44.5 tons are on the driving wheels. The high-pressure cylinder has a diameter of 19½ in., and the low-pressure 19¾ in. The stroke of the piston is 23.6 in. The total heating surface is 1,494 sq. ft. The valves are driven by the Walschaert valve motion coupled to a single lifting shaft, so that the three systems are connected. A full description of the locomotive is given in the Génie Civil for Dec. 1, 1900.

Express Locomotive With Auxiliary Driving Axle.

Railway Engineer (London), Nov., 1900, p. 346.

A curious engine was exhibited at Paris. The locomotive is of what we would call the "Atlantic" type as far as the wheels which she normally uses are concerned. There is, however, a small pair of driving wheels the same size as the truck wheels placed between them. This small pair of drivers is not part of the bogie, though it gives the engine the appearance of being mounted in front upon a six-wheeled truck. The auxiliary drivers, as they are called, are, when not in use, held up off the track a little over 1 in. by the action of two spiral springs located immediately below the running board. The auxiliary cylinders, 10¼ x 15¾ in., are placed ahead of the leading bogie, or truck-wheel. The auxiliary engine is only used in starting and accelerating heavy loads, or when climbing steep gradients, in which case the engine is able to exert the pull of a six-wheel-coupled locomotive. When it is desired to use this extra power, steam is admitted to two 7-in. cylinders, which, by the action of appropriate mechanism, bring the auxiliary drivers down on the rails and at the same time relieve the ordinary truck wheels of some of the weight usually carried by them. The small driving wheels are 1 meter in diameter, or 39.37 in. The main drivers are 6 ft. 1.62 in. in diameter. The disparity in size between the main and auxiliary wheels is not thought to be of consequence, as the latter are only used at comparatively low rates of speed.

The reason why the builders preferred the auxiliary mechanism to six coupled wheels is that the size of the main cylinders could better be proportioned for high speed, and the easier disposition of the boiler. The small driving tires are without flanges. When the auxiliary drivers are used the weight, 25.7 tons, on the engine truck is reduced to 12.3, and the small drivers then carry 13.4 tons.

(An illustration of this locomotive will be found on page 13.)

Cost of Overloading Locomotives.

Mr. C. H. Quereau, before the Rocky Mountain Railway Club, Oct., 1900, at Denver, Colo.

Mr. C. H. Quereau makes out a case for 15 miles per hour as the economical speed for freight trains. He gives a table showing the 10-mile-per-hour speed as against the 15 on two divisions, one 100 miles long and the other 200. He assumes four hours in each case as the time an engine would be in the roundhouse at the end of each trip. This is not accurate as a matter of fact, but it is as fair when placed in the 10-mile column as in the 15, and does not vitiate the conclusions he draws. His figures show that a decrease in each train sufficient to permit a rise in speed from 10 to 15 miles per hour will eventuate in from 10 to 22 per cent. increase in the total number of cars hauled by each engine. To put it briefly, his method of reasoning is that employed by those who have to fix the pay of enginemen and firemen. The passenger men are given a lower rate per mile than the freight men, but as they get over the road so much faster than the others, they make more trips in the month, and so draw a higher total pay than do the freight men.

Mr. Quereau shows that the gain when the speed reaches 20 miles per hour is only 2.5 per cent., and is not worth the increased hazards due to the higher speed.

The Northern Pacific have made quite elaborate tests to determine the most economical speeds for freight trains. That road finds, it is said, from 12 to 18 miles per hour to be most economical according to the class of engine used and other varying conditions, averaging 15.4 miles per hour.

The Confusion of Types.

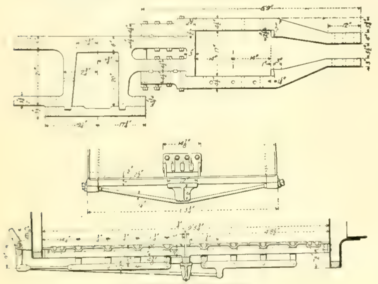
American Engineer and Railroad Journal, Dec., 1900, p. 374.

Mr. F. M. Whyte, Mech. Eng. of the N. Y. C. & H. R., suggests that the types of locomotives could be simplified by using figures, showing the number of wheels. For example, an "Atlantic" type engine would be a 4—4—2, that is, a four-wheeled truck, four drivers and two idle wheels. A "con solidation" would be 2—8—0, and so on through the list.

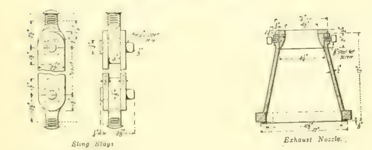
The Erie's Six-Wheel Switching Locomotive—Wide Fire-Box

Railroad Gazette, Dec. 21, 1900, p. 836.

Mr. A. E. Mitchell, superintendent of motive power of the Erie R. R., has designed a wide fire-box switching engine that should have certain advantages of the Wootten fire-box, without separating engineer and fireman. Six engines were built at the company's Susquehanna shops, the boilers having been built at the Baldwin Works. These locomotives are all equipped with the "Haven Jet," and so have been an important part of the Erie's fire service. The designer had in view the possibility of using, later on, the same general boiler design with greater depth of fire-box for burning soft coal at high speeds, and also the possibility of using any of the many wheel arrangements which constitute the principal difference



Grate Sections and Truss Support



Sling Stays

Exhaust Nozzle.

between the various types of engines. The engines burn the common mixture on the Erie east of Hornellsville, viz., 35 per cent. bituminous and 65 per cent. "bird's-eye" anthracite. The weight distribution is, on front pair, 44,700 lbs.; driver, 52,500 lbs.; trailer, 47,900 lbs. The front frame splice is simple and strong. The grate frames support in the center of the fire-box is trussed. The two front rows of crown stays are button-head slings, with a slot in the pinhole of the top one to admit of slight upward movement.

Compound Locomotives—Norwegian State Railways

Glaser's Annalen, Nov. 1, 1900.

A compound locomotive built for the Norwegian State Railways by Richard Hartman at Chemnitz and exhibited at the Paris Exposition is very fully illustrated in Glaser's Annalen for Nov. 1, 1900. The engine is of the ten-wheeled type, and is intended for both passenger and freight service. The total weight is 51.12 gross tons, of which 36 tons are upon the driving axles. The boiler has about 1,246 sq. ft. of heating surface. The engine is of the two-cylinder type with outside cylinders. The high-pressure cylinder has a diameter of 17.7 in. and the low-pressure of 26⅜ in.

The same article also gives the details of a compound locomotive with four wheels coupled and a pony truck back that has been built for the Netherlands Railroad, and also a four-cylinder compound locomotive of the Atlantic type for the Saxon State Railways. This locomotive, like the majority of four-cylinder compound locomotives on the European railroads, has one set of cylinders between the frames and driving a crank axle on which are the forward pair of wheels. The engine is intended for high-speed service, and has cylinders of 12¾ in. and 21⅞ in. in diameter, with a piston stroke of 26 in. The total weight of the locomotive is 67¾ gross tons, and the boiler carries a pressure of 225 lbs. per square inch. The outside high-pressure cylinders are fitted with the Toy valve motion, and the inside low-pressure with the Hensinger. There are a few peculiarities of this locomotive that are worthy of attention.

1. In order to protect the tubes from direct impact of the feed water and carry it back as rapidly as possible, copper shields are placed on the inside of the boiler back of the inlet valves. These turn the entering stream of water aside and cause it to flow back along the sheets of the boiler.

2. Brakes are applied to all the wheels of the locomotives. A special brake cylinder is used for the trailing wheels. The brakes are applied together upon all wheels and the Westinghouse system is in use.

3. In order to diminish the wind pressure the front of the cab is brought out to an angle, as also is the running board alongside the cab. In order to insure the safety of the enginemen against falling off, there is a gate that can be used to close the opening between the engine and tender.

4. The lubrication of the cylinders is accomplished by means of two mechanically driven oil pumps placed on the running board.

Malleable Iron Oil Cups

American Engineer and Railroad Journal, Oct., 1900, p. 323.

Oil cups for locomotives are very generally made of brass with brass covers. The brass cup is an object worth stealing, and the covers, which are easily lost, are valuable also. A malleable iron rod oil cup of good design was put into use on the Central of New Jersey about a year ago. From the bottom of the cup extends a tube, threaded so that the cup may be screwed home, but long enough to convey the oil direct to the pin without any chance for it to find its way between rod and brass. The base is thinned down in such a way as to gain the assistance of the elasticity of the bottom of the cup to hold it against turning back after it has been down firmly. The regulating needle is capable of very fine adjustment.

Large Tenders

American Engineer and Railroad Journal, Nov., 1900, p. 337.

This is one of the subjects which "Motive Power Officers Consider Important."

Large tenders are the rule on a number of roads. The Lehigh has adopted 7,000 gallons for freight and 6,000 for passenger engines. They have naturally had to be increased to keep pace with the increase in the size of locomotives, but the most cogent reason is the reductions of stops for water. This advantage is threefold. It permits the passing of points where the water supplied would be objectionable, which is an advantage in boiler maintenance. The ability of an engine to "keep going" is looked upon with favor by the operating department, and the fewer stops for water eliminates the number of emergency brake applications at water tanks and columns which play havoc with draw gear and car equipment generally.

Sloping sides of the coal space in the tender is coming more into vogue. The heavier work of the fireman in recent days has made any advantage given to him one of importance.

The improvement in water service is on the tapis, and the rapid delivery of water, when a stop is made, is one which must follow the enlargement of the tender.

Water pipes for cooling locomotive and tender bearings have been taken off by the Lehigh Valley, as the tendency was to use water to excess and neglect proper lubrication.

The Use of Liquid Fuel in Locomotives

Transport (London), Oct. 12, 1900, p. 309.

This is the subject of a paper by Mr. James Holden, locomotive superintendent of the Great Eastern Ry., contributed for discussion at the sixth session of the International Railway Congress. At first tar from the G. E. Ry. Co.'s oil works at Stratford, was used, which at the time was a waste product. Experiments were made originally under the boiler of

a stationary engine. In the experiments and in the subsequent use of liquid fuel, Mr. Holden has always employed it as an auxiliary, that is to say, he so arranged matters that the engines were equally adapted for solid fuel, or a combination of solid and liquid fuel.

The liquid fuel fire was kept above the level of the coal fire, and to all intents and purposes the two fires were distinct when both were employed. Two burners, the best form for which were determined by experiment, and in which the fuel is sprayed by a steam jet, were used. The brick arch has been retained in the fire-box to prevent the too direct passage of the heated gases through the flues. When coal and liquid fuel are used together a thin layer of slow-burning coal was found most efficient. When liquid fuel alone was used steam is raised with a wood or coal fire in the usual way, when the gauge shows between 30 or 40 lbs. pressure, the starting fire is leveled over, and a thin layer of broken firebrick, composed of the remains of old arches, is thrown in. Mr. Holden tells us that "Hydro-carbons and residues of high flash point and heavy density have been found the best for use as fuel."

A suitable plant for storing and delivering the liquid fuel to the locomotives has been devised, so that it can be worked by four men.

A main line express engine can take 600 gallons of this fuel in less than five minutes. Engines on G. E. Ry. have been run through from London to Cromer, 138 miles, in 175 minutes, with one stop of four minutes' duration made within seven miles of Cromer, on a consumption of 190 gallons of tar residues. This is equivalent to 14.4 lbs. of oil fuel per train mile, plus 6. cwt. of coal used to raise steam in the first place, making a total of 19.4 lbs. per mile. The train spoken of consists of 17 vehicles, weighing, without engine and tender, 270 tons 17 cwt. In each case liquid fuel was first introduced in combination with coal. Driver and fireman soon discovered the advantage of the liquid over the solid fuel firing, and consequently make use of the former to the fullest extent.

Liquid Fuel on Japanese Railways

Railway Engineer (London), Aug., 1900, p. 226.

In the course of the year 1899 experiments were made by various railway companies in Japan in the use of liquid fuel in their engines. The results of the trial of oil are said to have been favorable. It has been tried on several engines since the spring of 1899.

In that country the supply of liquid fuel is limited, and petroleum from Borneo has been imported for railway use.

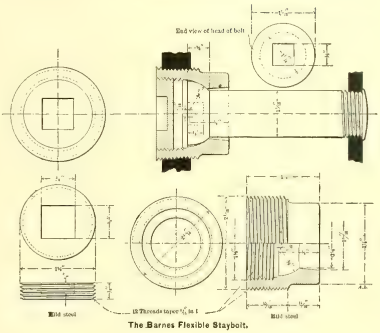
Another Improvement in Staybolts

American Engineer and Railroad Journal, Dec., 1900, p. 365.

Mr. J. B. Barnes, superintendent motive power of the Wabash Railroad, has designed a form of staybolt which is intended to obviate a very serious defect which exists in the usual form of bolt. He aims to relieve the staybolt from being strained to the breaking point, and to provide for the movements of the sheets with reference to each other, in such a way as to leave only the tensile strains for the staybolts to carry. The construction is that of a ball head fitted into a cup-shaped socket in the outside sheets, and the bolt is screwed into the inside sheets in the usual way.

The socket, or cup, is made from bar steel, or it may be drop forged, and is screwed into the outer sheet. After the cup is in place the bolt is entered and screwed into the inner sheet by means of a square tool which fits into a corresponding hole in the ball-shaped head of the bolt. A holding-on bar is used while the bolt is being riveted over in the fire-box. A shallow taper plug is then entered and screwed in flush with the edge of the cup, with the other end of the wrench that was used for the bolt. This plug serves the double purpose of preventing any leakage which may escape past the ball joint, and tends to slightly spread the cup and so insure a perfectly tight joint between cup and outside sheet. A small space between the ball head of the bolt, and this plug permits of the approach of the two plates of the fire-box toward each other.

When it is desired to remove a bolt the plug is removed, and the inside end having been clipped and drilled, the bolts can be withdrawn without injury to or disturbance of the cup. The cup can be put in so as to stand flush with outside sheet, and so the bolts may be placed behind frames, brackets, etc., without difficulty.



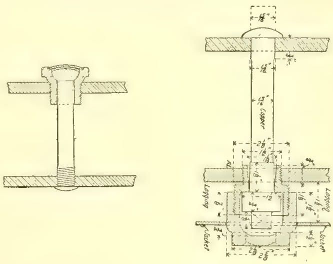
The Barnes Flexible Staybolt.

This and other designs of flexible staybolts are sometimes criticised on account of the large holes in the outer sheets. The fact, however, that flexible staybolts requiring these large holes have been in use for years with no bad results, is considered sufficient answer to that objection. Destructive tests of Mr. Barnes' staybolts have been made at Purdue University. The tests show an ample margin of strength and cup bolt and head proved to be almost co-equal in strength.

Flexible Staybolts in India

American Engineer and Railroad Journal, Oct., 1900, p. 320.

This is a communication from Mr. Cornelius E. Cardew, Locomotive and Carriage Superintendent, Burma Railways, in which he claims priority of invention of flexible stays for Mr. Wehrenfennig, of Austria. Subsequently the Wehrenfennig system was improved by Mr. W. Leach, foreman boilermaker of the Rajputana Malwa Railway of India. Both



staybolts are described. The first staybolt consists of a socket screwed into the outside sheet, which contains a square-shouldered head, with a cap screwed over the socket on the outside. The Leach bolt, however, has a cupped-out socket, which takes a ball-shaped head. The head being very neatly and compactly closed over by a sheet copper cap which fits into a groove in the bushing or socket. Mr. Cardew gives valuable testimony to the worth of flexible staybolts in prolonging the life of a fire-box.

Staybolts

American Engineer and Railroad Journal, Dec., 1900, p. 368.

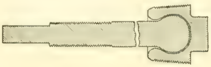
Under the heading "What Motive Power Officers Consider

Important," it is said that anxiety about staybolt breakage has increased rather than diminished during the past few years. High pressures do not appear to have increased the present rate of breakage. The fear of neglect in inspection and the large number of broken bolts found together, with the tendency to still higher pressures, causes the uneasy feeling. It has brought a number of conservative motive power men to look for relief, even when accompanied with considerable expense.

Service of Flexible Stay Bolts.

Railway and Engineering Review, Dec. 15, 1900, p. 705.

A flexible staybolt designed by Mr. F. W. Johnson, superintendent of motive power of the Mexican Central Railway, is shown in the engraving. The bolt has been in service eleven months in an engine carrying 180 lbs. pressure. The recess in



the head did not become corroded, though the water used was said to be rich in encrusting material. An examination of the bolt appears to have demonstrated the absolute necessity for flexibility in staybolts, the movement of the head within the cap being clearly evident. The bolt was taken from the first row in the front of the fire-box.

A Study in Locomotive Fire-Boxes

American Engineer and Railroad Journal, Dec., 1900, p. 371.

Mr. F. F. Gaines, Mech. Eng. of the Lehigh Valley R. R., mentions the "Vanderbilt" boiler as the only radical departure from general practice which this country has seen in the direction of a mitigation of the stay-bolt evil.

The state of repose of any surface under pressure is shown, by the description of a simple but convincing experiment, to be always a portion of a true circle.

The important point made in the article is, however, that any design of fire-box which leaves the outside sheet in a state of rest and in which it has no tendency to alter its shape, under variations of pressure, must greatly relieve the tendency to

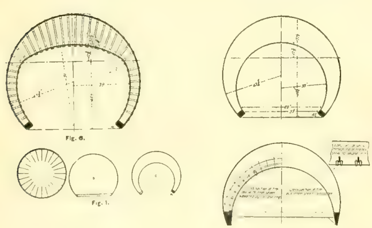


Fig. 6.

Fig. 1.

distortion and stress upon staybolts. A form which tends to alter its shape under pressure throws upon the bolts not only the legitimate load due to the steam pressure, but forces them to carry the heavy, extra strain necessary to keep the sheets from assuming the shape which they would if free to move. This useless load constantly carried is probably very much greater than that due to the direct steam pressure.

Mr. Gaines submits a design which he says would require no staybolts. It consists of segments of two circles joined at the point of intersection with a mud ring. Both sheets are in a state of repose and the inner one might either be supported by collapse rings or made of corrugated material, which is self-sustaining against collapse. Such a form is applicable to the wide type usually required for the combustion of hard coal.

Wide Fire-Boxes

American Engineer and Railroad Journal, Nov., 1900, p. 337.

A column on "What Motive Power Officers Consider Important" says:

Wide fire-boxes for soft coal appear to be the order of the day. This change appears sudden, but it is not so in one way. The necessity of the change was felt long ago. The movement having started is becoming general. From recent developments it is clear that grate areas should not be proportioned to heating surface or volume of cylinder. They should be made to suit the coal and the demands on the fire. An illustration of this was given of this on a certain trip where the coal supplied was too good. At the outset of the trip a tender of the best soft coal in large lumps had been put on by mistake. The fire-box was one of the new wide type designed to burn slack. The good coal was no good, if such a paradox is permissible, and, despite skilful handling the steam ran down to 100 lbs. When the good coal was used out it was found that the bottom of the tender had been filled with slack, and the engine steamed beautifully. Grates should be large enough to burn enough of the poorest coal to make steam for the hardest work, and when better coal is used the area should be reduced by blocking up a portion of the grates. This applies to hard as well as soft coal.

Steel Tubes for Locomotives

American Engineer and Railroad Journal, Nov., 1900, p. 354.

The test of service on locomotive tubes is one of the most severe that any material is ever subjected to. Steel for tubes is making its way to the front, and satisfaction has been experienced by those who have used steel tubes, particularly those made by the Shelby Steel Tube Company of Cleveland, Ohio. Favorable opinion is based on trials in the middle and far West with the worst water in those districts. An example is given of one set of tubes which in one engine made 78,810 miles. The tubes were supplied to another engine and made 54,694 miles in her, and finally in a third, which ran 39,893, a total of 173,397 miles. Another road obtained service of 107,000 miles without the tubes giving any trouble. These tubes are made from the best material. They are drawn from solid material without welds. The drawing process could not be applied to any but the best material, and it insures homogeneity. Steel safe ends have been welded to charcoal iron tubes, and have given entire satisfaction.

Boiler Design

American Engineer and Railroad Journal, Nov., 1900, p. 337

Under "What Motive Power Officers Consider Important" the American Engineer informs us that boiler design, in view of the tendency to increased pressure, goes hand in hand with a certain amount of anxiety regarding the care of staybolts. During the last few years the shape of fire-boxes has been greatly improved by avoiding sudden changes of curvature in the side sheets. One of the possibilities of the future is the use of specially prepared copper for staybolts. Copper has been "treated" to give a tensile strength between 45,000 and 50,000 lbs., and if it is found that it possesses ability to withstand frequent bendings, it may again become a feature in boiler construction.

Twelve Wheel Wide Fire-Box Freight Locomotive

American Engineer and Railroad Journal, Nov., 1900, p. 342.

This locomotive, built at the Brooks Locomotive Works for the B. R. & P. Ry., has a wide fire-box, and is intended to burn bituminous slack. The boiler is of the Player-Belpaire type, with sloping grate. The mud-ring is unusually deep along each side, and this is done with a view of having a good form of ash pan attachment. The Belpaire staying in a crown sheet having a grate 6 ft. 8 in. wide below it, is a novelty. The engine has piston valves with internal admission and marine links with short valve travel. The exhaust pipe is a new design by Mr. John Player, mechanical engineer of the Brooks Locomotive Works, which is said to be very satisfactory.

Cleaning Locomotives

Engineer (London), Nov. 2, 1900, p. 442.

In an editorial note the Engineer calls attention to the dirty appearance of the suburban locomotives of the South-Eastern & Chatham, and of the London, Brighton & South Coast railways. The locomotives in question, the editor says, would disgrace a French railway, which he thinks is saying a good deal. "A locomotive that looks neglected is neglected. The drivers cease to take an interest in it, and it goes from bad to worse with surprising rapidity. . . . One word in conclusion—dirty locomotives imply oppressed locomotive superintendents, or an unusually obstinate Board of Directors."

Lubrication

American Engineer and Railroad Journal, Dec., 1900, p. 367.

A few words on this subject are said under the caption "What Motive Power Officers Consider Important."

The article on lubrication from the standpoint of fluid pressures will probably lead, it is said, on a number of roads, to experiments, with oil grooves in the sides of driving boxes and closing up the oil holes and cavities in the tops of the bearings.

The Concord Repair Shops

The Boston & Maine Messenger, Dec. 1, 1900, p. 1.

The Boston & Maine shops at Concord, N. H., are intended for the repair work of the Concord, White Mountains and Worcester, Nashua and Portland divisions, and also of a part of the Southern Division. The plant has been in operation less than two years. The locomotive department handles the repairs of about 250 engines, while the car shop capacity is about 400 freight and 50 passenger cars per month. The steam plant is in one building, and the distribution of power is by means of electricity. All the buildings, except the lumber shed, are of brick with granite trimmings, and all are one-story structures, with the exception of the storehouse and office quarters. They have been arranged to provide plenty of natural light, and provision has been made for the further extension of every building. A feature of the shop is a wash building near the locomotive shop, which can accommodate 150 men at once. It is 62 x 26 ft., and is used by workmen in the locomotive and blacksmith's shops. The north end of this building contains tanks for the removal of grease from the running gear of locomotives.

The Indicator

Locomotive Engineering, Nov., 1900, p. 478.

The Traveling Engineers' Association report on the use of the indicator forms the text with which this article déals. The indicator has not had a fair chance to show what it can do for the locomotive. It has not been used to show up defects in th engines on the road, it has more often been used to bring out the good points of some new design of valve motion or some new way of setting valves. The timely suggestion is made that to popularize the use of the indicator among locomotive runners, they should be given a chance to study its records. The writer says: "Pick out the engine that does the poorest work for the amount of money it costs to run her, and try the machine on her; then, when the trouble is located, make some changes which will improve her work. If you cannot show good results the indicator will be a failure in the opinion of all."

Testing the Vacuum Automatic Brake.

Railway Engineer (London), Aug., 1900, p. 226.

The South Eastern and the London, Chatham & Dover managements have been combined with economy as the object, and two systems of brakes in use are to be reduced to one. Some experiments recently made with the vacuum automatic brake showed that a train weighing 170 tons traveling at a speed of 60 miles per hour on a falling gradient of 1 in 100 was stopped in 35 seconds after running 596 yards. When going 50 miles an hour the stop was effected on a falling gradient of 1 in 2,211, in 22 seconds after 350 yards had been traversed. At 60 miles an hour on the level it took 20 seconds to stop the train in a distance of 308 yards.

Economy of Oil and Oil Cans

American Engineer and Railroad Journal, Dec., 1900, p. 367.

What "Motive Power Officers Consider Important" is the heading of a number of paragraphs, one of which tells how Mr. G. R. Henderson, of the Chicago & Northwestern, has put into practice a simple plan of keeping track of the amount of oil used by each engineer, which requires only as many oil cans for each kind of oil as there are engines. When an engineer reports for duty, he receives a full can; at the end of the run it is filled up again, and he is charged with the amount required to fill it.

Pittsburg Two-Cylinder Compound for the C. & E. I. Ry.

Railway and Engineering Review, Nov. 10, 1900, p. 631.

This compound for the C. & E. I. possesses a certain amount of interest by reason of the fact that it has a wide fire-box for soft coal, carried on top of the frame, the engine itself being of the 12-wheel type. The fire-box is of greater depth than that usually provided for anthracite coal, and the grate area is exceptionally large, and it goes without saying that the cab is placed in front of it. The main and intermediate wheel tires are without flanges. The driving wheel center is of cast steel, the others being made of cast iron. The frame to cylinder fastening is the new Wightman plan, first applied to the big P. B. & L. E. Ry. consolidation locomotives. The C. & E. I. locomotive has no front braces from smoke-box to frame.

Erecting Shop Methods

American Engineer and Railroad Journal, Nov., 1900, p. 337.

A number of interviews with prominent railway men, entitled "What Motive Power Officers Consider Important," brings out the fact that methods in erecting shops have changed somewhat. Formerly a gang stripped an engine, distributed its parts for cleaning and repair, and re-assembled the parts. Now, in many shops, a gang of unskilled men, under a foreman, do this work, and relieve the regular erecting gangs of all work which may be entrusted to relatively unskilled labor. The effect on these men has been to develop an unexpected amount of intelligence among them, which may lead to a recruiting source for the erecting gangs.

The Dangers of Spring Balance Safety Valves

The Mechanical Engineer (London), Dec. 1, 1900, p. 758.

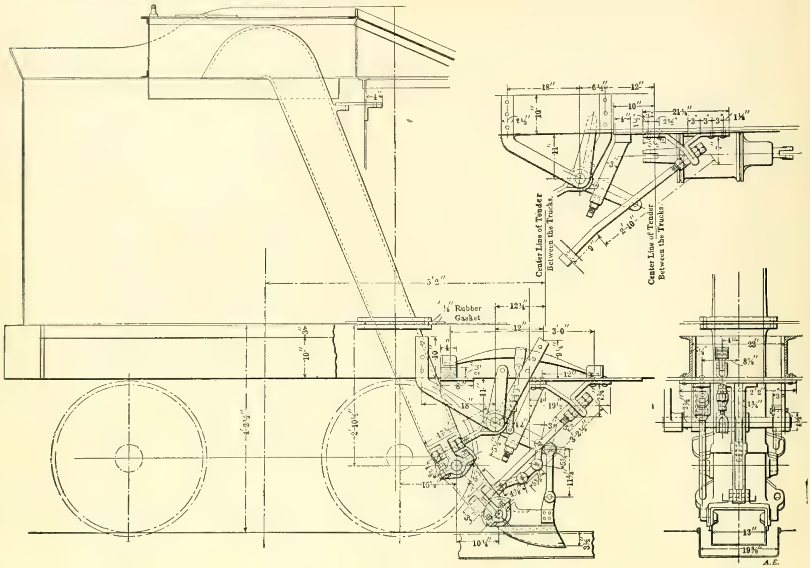
A recent Board of Trade report calls attention to the dangers of the spring balance for safety valves. The spring balance may be all right. It can be made all right, but there is great danger that it will not be so made, or so maintained. It is liable to give false readings, and can be most easily rendered inoperative by a few turns given to a thumb nut by a careless, ignorant, or reckless person. The writer says: "The force necessary to stretch the spring and show the reading on the scale of the balance is the same whatever be the part of the lever to which it is attached," by which we imagine he means that to draw the pointer to the 100-lb. mark it is always requisite to apply 100 lbs. to the spring balance; but that might have little or no relation to the pressure per square inch within the boiler and upon the safety valve.

Flanges on All Drivers

American Engineer and Railroad Journal, Dec., 1900, p. 367.

This subject is dealt with in a "chapter" on "What Motive Power Officers Consider Important."

Flanges on all drivers appear to be the rule almost everywhere, the problem being with flanges, how to give the necessary lateral motion to allow for the effects of curving. One way is to set the tires in toward the center of the track. Another is by making the gauge of the central wheels of 10-wheeled and consolidation engines narrower than the standard. Again by setting the tires to standard distance and paring down the flanges where they bear against the rail, or by setting the tires of the middle wheels at somewhat less



Track Tank Water Scoop.—Lake Shore & Michigan Southern Railway.

than standard distance and leaving them of standard contour, but giving the wheels sufficient play to accomplish the same result as the other methods. On the Lehigh Valley ⅜ in. lateral play is allowed.

Track Tank Water Scoop

American Engineer and Railroad Journal, Nov., 1900, p. 344.

The L. S. & M. S. have lately designed a track tank water scoop to be used at very high speeds. Tests made with the new apparatus show that the effort of the designer to meet some very hard conditions in service have been eminently successful. Mr. H. F. Ball, mechanical engineer of the L. S. & M. S., has been able to apply a construction which permits the scoop to be raised by hand at a speed of 70 miles per hour; one which would not require the working joints to be machined, which would not cause a splash at the highest speeds, and which would also permit of a power-lifting attachment using compressed air.

The whole thing is well designed. One very cleverly contrived feature is that when the cutting edge of the mouthpiece is lifted out of the water—and a very slight elevation will accomplish this—the rise of the mouth changes the angle to one at which the water in the trough will, by its pressure on the under side of the rapidly moving scoop, assist the raising action of the lifting lever.

Remarkable Locomotive Mileage

American Engineer and Railroad Journal, Nov., 1900, p. 347.

Mr. W. C. Arp, superintendent of motive power of the Vandalia Line, writes to the American Engineer, and gives the mileage of Engine 177 from the time she came from the Schenectady Locomotive Works until she was taken into the shops for classified repairs as 165,013 miles. She is a 20 x 26-in. eight-wheeled passenger engine, and ran from March 23 until August, 1900. Had it not been that the engine was in an accident 200,000 miles would have probably been her performance. She lost 29 trips in that time.

A Novel Blast Pipe

Locomotive Magazine (London), Dec., 1900, p. 195.

Mr. J. Jones, locomotive superintendent of the Cyfarthfa collieries, in South Wales, has brought out an improved exhaust pipe, which has been in successful operation for some years. The device consists of a cast iron exhaust pipe provided with a perforated semi-circular jacket which commences just above the lower flange and terminates in a circular nozzle slightly above the top edge of the inner pipe. A great deal of economy is said to result from the use of this form of blast pipe.

Locomotive Saloon, London and Southwestern Railway

The Engineer (London), Sept. 28, 1900, p. 316.

This machine would in this country be called an inspection locomotive. It consists of a small tank engine having a four-wheeled truck and a single pair of drivers, the back portion being a short railway carriage carried on four wheels, fitted up for the use of the locomotive engineer. It may be as well to mention that the locomotive engineer for whom this neat-looking combined engine and carriage is designed is probably one of the officers of the mechanical department. He communicates his orders to go ahead, stop, or back, to the "driver" by means of a gong operated by an electric push button.

Liquid Fuel

Trade Journals' Review (England), Dec. 15, 1900, p. 6.

Speaking of the use of fuel oil on steamers, liquid fuel, if efficiently treated, shows a reduction in consumption of about 40 per cent. as compared with coal—a reduction in bunker space of about 15 per cent. for the same weight of fuel; a reduction of about 50 per cent. for the same radius of action and a reduction in the stokehold staff of at least 50 per cent.

Car Equipment and Appliances

The Steel Box Car

Railway and Engineering Review, Dec. 22, 1900, p. 720.

The successful use of steel for gondola and hopper cars has naturally suggested the question of building the steel box car. A full coal or ore car is of necessity uniformly loaded, and the weight carried occupies minimum space. The car, while being amply strong, has had its weight kept down as low as possible.

With the all-steel box car the case would be different. The dimensions of the body are relatively large, and with sides, ends and roof of steel the car itself would weigh more than if these parts had been made of wood, and this increase of weight is not a desirable feature.

The steel underframe and wooden body form of construction seems to have much to recommend it. Steel shapes in light sections, angles, tees and other forms can be combined easily to produce a most substantial construction. In wrecks this form of car would present some features worthy of consideration. The steel frame would probably not suffer very badly, certainly less than one of wood. The sides and roof could be more easily repaired than if made of steel. In case an all-steel car was badly wrecked, it is suggested that the distorted steel car might be unable to pass through a truss bridge to a repair point without a great deal of work being done on it at or near the scene of the disaster, and that no such trouble would ever be experienced with the wooden car with the steel underframing.

Draft Gear and Couplers for Heavy Service

Railroad Gazette, Nov. 16, 1900, p. 749.

Mr. George Westinghouse, writing to the Gazette under this caption, advocates the selection of a form of car coupler and draft gear capable of giving a good account of itself under the heavy service conditions which the introduction of larger locomotives and bigger cars has brought about. The difficulties experienced in the operation of mixed trains have proved that existing draw gear must be materially strengthened to avoid accidents and to prolong the life of the millions of wooden cars used to-day. It is said that of all the cars out of service waiting repairs, fully 70 per cent. of them are there due to defective draw gear. After years of work and of practical experience in the development of the friction draft gear Mr. Westinghouse feels that such a selection as he proposes can now be made, and that nine-tenths of the losses due to the use of the present inadequate kinds will be eliminated. He thinks also that some arrangements between parties interested in the manufacture of couplers could be brought about by an exchange of licenses under controlling patents upon terms which would insure to each party a proportionate share of the larger business which would result from the general use of a stronger and heavier coupler.

Capacity of Draw Gear

American Engineer and Railroad Journal, Dec., 1900, p. 368.

In the account of a series of interviews with motive power men, the American Engineer says: "It seems fair to believe that the capacity of draw gear, as usually constructed, is not sufficient to stand the severe service which the use of heavy locomotives has brought about. Many roads have under consideration new designs for tandem and twin spring arrangements. The presence of the Westinghouse friction draft gear in a number of roundhouses indicates the necessity for better protection of tenders and cars from the excessive shocks incident to modern service. Tenders of heavy locomotives are excellent vehicles upon which to test the durability of any form of draw gears, for the buffing shocks and pulling strains probably reach their maximum between tender and first car in every train. The subject of improved draw gear is probably the most important subject in connection with cars at any time."

The M. C. B. Coupler.

Remarks of Mr. J. E. Dillen, General Yard Master, Southern Pacific, at the October Meeting of Pacific Coast Railway Club.

Mr. Dillen, answering the questions, "The M. C. B. vertical plane coupler, is it a success?" "Has it come to stay?" made a few remarks about one or two of the well-known forms. He spoke of the opening in the top of the couplers through which the locking-pin or chain to lock block works, as one of the defects from which certain of the M. C. B. couplers suffered. The opening, even if small enough to permit only of the free working of a pin, nevertheless presented a passage through which dirt and sand would eventually work, and in time obstruct the operation of the lock block within the head. The "Trojan" was mentioned as a type free from this defect, and one which had the additional advantage of not having the lifting device on top of the deadwood, which in the case of other couplers, was often interfered with, and rendered entirely inoperative by projecting loads. Mr. Dillen advises great care and skill in the mechanical work on all forms, and favors increasing the strength of the various parts. He referred also to the trouble experienced in unloading trains from transfer boats plying upon tide waters. During low tides the cars frequently became uncoupled, and had to be drawn off the boats by means of links and pins, thus causing long delays.

Corrosion of Steel Cars.

American Engineer and Railroad Journal, Dec., 1900, p. 383.

In France Mr. Tolmer in 1896 found that steel frame cars showed the following proportion of losses in section from corrosion.

Cars built in	Life.	Loss, per cent.
1869....................	27 years	6.0
1874....................	22 "	4.0
1875....................	21 "	3.18

Reasoning from analogy; steel cars are subjected to much less severe service than locomotive tenders, and no one hesitates about the material for coal spaces in tenders. The general conclusions are that steel cars should not be used for the storage of soft coal for any length of time, and should be painted thoroughly and often.

Acetylene for Car Lighting

Railway Age, Nov. 16, 1900, p. 388.

Mr. Lipschutz, of the Great Northern R. R., replying to Mr. J. M. Morehead, in the Railway Age, says that acetylene gas, if compressed to 150 lbs. and confined in a pipe or reservoir and heated to 1,432 deg. F., will violently explode. The Great Northern R. R. has, therefore, made use of tanks having seams soft soldered and high pressure pipes under cars which are composed of fusible material. In the event of a wreck in which the car is burned or the pipes or tanks come in contact with fire, a temperature of 400 deg. F. is sufficient to spring a leak and allow the acetylene gas to escape and burn, without any possibility of explosion. This construction is patented.

Car tanks cannot be charged with gas at a pressure of 300 lbs., as this would necessitate an initial pressure of 400 lbs. in the main supply tank, and in winter this pressure at a temperature of 35 deg. below zero would liquefy the gas.

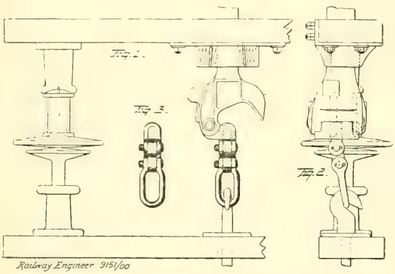
A Pintsch gas equipment, he says, is unsuitable for acetylene gas, for the reason that in the Pintsch lamp the gas way is central, and the gas is heated by the surrounding lights on its way to the burners. When acetylene gas is so heated in a Pintsch lamp, the burners require to be renewed more than once a month.

Any form of compressor will not do for acetylene gas; the Great Northern has therefore designed and built a special compressor for this gas. A Pintsch gas compressor is found to deliver acetylene gas at too high a temperature. To get full candle power out of acetylene gas, it is requisite that during generation, purifying, drying, compressing, storing, and until it leaves the burner tips, it be not subject to a temperature sufficient to polymerize the gas. This word used in chemistry signifies a certain molecular change; which condition appears to be detrimental to its illuminating power.

Coupling for English Cars

Railway Engineer (London), Oct., 1900, p. 304.

Under the head of Couplings, a British patent has been granted to Mr. James Timms, of Columbus, Ohio. The invention provides for the coupling together of vehicles, having the vertical plane coupler (such as is used in the United



States and Canada) and those using the ordinary British hook and links. The device is a pair of open links connected by a solid one. The larger of the two engages with the hook in the usual way, and the smaller open link fits in the link slot of the knuckle and requires the use of a coupling pin. The buffers used on British carriages and goods wagons maintain the vehicles at the proper distance.

The Drop Test as a Means of Showing Relative Strength of Draft Gears

Proceedings of the Western Ry. Club, Nov., 1900, p. 160.

Mr. R. P. C. Sanderson's paper on the above-named subject details some tests made by the A., T. & S. F. R. R. The weight of the drop was the usual 1,640 lbs. A number of different draw gears were subjected to experiment, with varying results. Mr. Sanderson is emphatic in saying that the lug or turndown lip on the yoke or pocket to grip the shoulder of the coupler is an absolute necessity. He also maintains that the breakage of yokes demonstrated that nothing less than 1⅛ in. x 4 in., good iron should be used for yokes, and that large radii and easy bends at the back corners were essential.

After three blows at five feet and ten blows at ten feet had been delivered and no serious damage had been done, the springs were removed and replaced by hollow metal cylinders. The blows struck under these circumstances were particularly severe, yet after the series was completed, it became evident that further tests were needed to reach definite results.

The discussion on the paper, a good deal of which was necessarily devoted to the criticism of the method of making the tests, developed the fact that after nearly every blow the draw lugs had been tightened up, and the draw timbers tightened up to the sills, which was said not to be service conditions. The withdrawal of the springs and the substitution of the solid cylinders was also held to be a departure from service conditions.

The importance of the question and the desirability of making these tests was very clearly brought out by Mr. Deems, who reminded the club that in 1896 it had been told that a steady decline in the number of cars sent to the repair track for drawbar and draw rigging had been noticed since 1892, but that from recent information on the subject which he had collected, he found that now draw gear and couplers sent about 34 per cent. of all "cripple" cars to the repair track, couplers being responsible for 16 per cent. and draw gear for 18. Defective wheels only reached 10 per cent. and trucks went as low as 7.

Mr. C. F. Street, of the Dayton Malleable Iron Company, described some service tests made by his company upon draw gear of their own, in which two cars heavily loaded with scrap had been brought together at speeds of about 16.4 and 15 miles per hour, and though the cars had been rendered unserviceable after each collision, the only damage to the draw gear had been a slight bending of the followers and stop bars. The result of the tests of this form of draw gear made at the Purdue University are also given.

Mr. Street quoted from a table in the Railroad Gazette of December, 1899, to show that repairs to draw gear were decreasing, due, he thought, to the large number of improved draft riggings with increased spring capacity which had been introduced during the last few years.

Sleeping Cars and Infectious Diseases

Railway Surgeon, Dec. 11, 1900, p. 326.

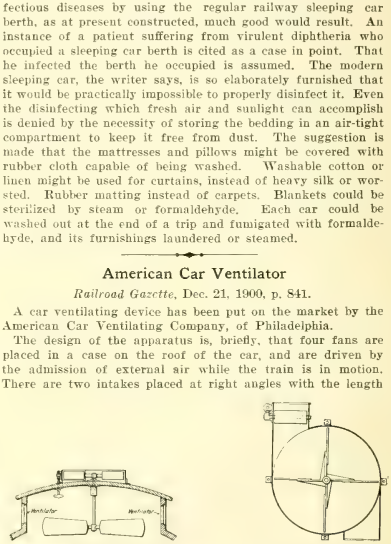
It is pointed out in this article that if the general public could be aroused to a sense of its danger of contracting infectious diseases by using the regular railway sleeping car berth, as at present constructed, much good would result. An instance of a patient suffering from virulent diphtheria who occupied a sleeping car berth is cited as a case in point. That he infected the berth he occupied is assumed. The modern sleeping car, the writer says, is so elaborately furnished that it would be practically impossible to properly disinfect it. Even the disinfecting which fresh air and sunlight can accomplish is denied by the necessity of storing the bedding in an air-tight compartment to keep it free from dust. The suggestion is made that the mattresses and pillows might be covered with rubber cloth capable of being washed. Washable cotton or linen might be used for curtains, instead of heavy silk or worsted. Rubber matting instead of carpets. Blankets could be sterilized by steam or formaldehyde. Each car could be washed out at the end of a trip and fumigated with formaldehyde, and its furnishings laundered or steamed.

American Car Ventilator

Railroad Gazette, Dec. 21, 1900, p. 841.

A car ventilating device has been put on the market by the American Car Ventilating Company, of Philadelphia.

The design of the apparatus is, briefly, that four fans are placed in a case on the roof of the car, and are driven by the admission of external air while the train is in motion. There are two intakes placed at right angles with the length



Section Through Clear Story and Case. Plan of Case—Cover Removed.

American Car Ventilator.

of the car. The admission of air is controlled by valves. The shaft passes through the roof and carries two larger fans which are thus made to rotate in the clear story of the car while the train is moving. The exhaust of vitiated air is through ventilators in the clear story. Motors and fans run on ball-bearings which require oiling but once a year.

This apparatus was used last summer on two of the crack trains of the Reading, between Philadelphia and Atlantic City, and its performance was said to be most satisfactory.

Rapid Car Construction.

Railway and Engineering Review, Dec. 8, 1900, p. 690.

On Nov. 5 the C., B. & Q. R. R. placed an order with the Pullman Company for three new mail cars, and they were delivered to the railway on the morning of Nov. 17. As Nov. 6 was election day no work was done on the cars, except a few hours' work by laborers moving material. That leaves 10 days in which the cars were built. Monday, 5th, the draughtsmen completed plans and dimensions sufficient to enable the shop to start at the sills and framing. Mail racks and fittings were ordered by express. Friday night, at 8 p. m., the bodies were completed and a coat of primer was put on in

the night. Saturday the bodies were all allowed to dry, and Sunday they were puttied. Monday saw a coat of rough stuff go on, and Tuesday saw a second; Wednesday, rubbed down; Thursday, two coats of color were applied, and the gold leaf lettering and striping were done. On Friday the cars were varnished and delivered on Saturday morning, Nov. 17. Of course, the color was made thin and to dry rapidly. No mention is made of the days in which the mail racks and interior fittings were put in and the heating, gas and air-brake piping applied, but it is stated that no work was done after 8 p. m. Two delays, owing to alterations by the railway company, added to the speed with which the work was done.

Modern Railway Lighting

Leonard's Railway News, Dec. 22, 1900, p. 4.

Lighting of trains is entering on the luxurious stage. On a recently equipped Western train there were 256 electric lamps with a total candle-power of 3,356. Tests were made with a photometer to ascertain the amount of light falling upon points where passengers usually hold reading matter. Electric fans are used in the dining and buffet cars. A transparency lighted by twelve lamps is attached to the rear platform with name of train thereon to advertise it, not only when it stands in the station, but as it flies across the country in the night.

Vestibules and Connections for Corridor Cars

Locomotive Magazine (London), Nov., 1900, p. 185.

There is not much uniformity about the construction of end vestibules and their attachments in Great Britain, as at present a Midland or a London & Northwestern dining car cannot be conveniently coupled to a Great Central or Great Northern corridor car owing to the different construction of their ends. The writer hopes that the excellent American plan of having standard couplers, vestibules and connections will eventually be adopted by all concerned.

Steel Flat Cars 100,000 lbs. Capacity

American Engineer and Railroad Journal, Nov., 1900, p. 339.

The New York Central have recently had 10 flat cars constructed by the Pressed Steel Car Company of Pittsburgh. Pressed steel parts have been used exclusively except for plank deck and stringers. The outside sills are continuous, but the center sills are cut at the body bolsters to let those members through. The sills are four pressed steel channels 10 in. deep at the ends, and from the inside of body bolsters they begin to deepen, reaching a depth of 17 in. for a length of about 7 ft. at the center. Like all cars with steel underframing, the center line of draw-gear is nearer the center line of the end sills than is possible with the ordinary flat car, where the draw timbers are bolted to the under side of the center sills. This makes the deck of the car somewhat lower than that of the wooden car, which is no doubt an advantage considering that they are intended for the transportation of heavy machinery, narrow-gauge locomotives and other heavy objects which cannot be conveniently loaded into box or gondola cars. The cars have Fox trucks, 33-in. wheels weighing 650 lbs. each, and open-hearth steel axles with 5 x 9 in. burnished journals.

Freight Car Paint

Railway Age, Nov. 16, 1900, p. 388.

The paint used on freight cars to-day is not as good as that used 25 years ago. Formerly four or five days was allowed for paint to dry. To-day the urgent demand for cars has greatly reduced the time allowance for paint to dry. The result has been that paint has been made inferior in quality for the sake of gaining time. The use of dryers has been the cause of the deterioration and also the cause of the gain in time. One of the dryers used is rosin oil, or some compound of rosin mixed with coal oil, corn oil, cottonseed oil, manganese, etc. This drying oil hastens the drying of paint, but it shortens its life very considerably. Rosin oil when dry leaves common rosin as a residue. Rosin is a hard, brittle substance without elasticity, and if used in spring, summer or fall, cracks and checks in winter, leaving the paint on the car divided up into small squares about a quarter of an inch in area. It cannot stretch or contract to accommodate itself to variations of temperature, as pure linseed oil paint would do. To appreciate fully how rosin-oil dryers kill linseed oil paint, it is only necessary to select a car so painted which has been in service 8 or 10 months. To the surface of this car apply a drop of hard linseed oil. It should run down as oil runs down on a window pane. On the car surface the oil drop runs down perhaps a quarter of an inch, and then spreads out, making a spot about an inch in diameter, and is absorbed as ink by blotting paper, showing that the rosin-oil dried paint is porous, and, therefore, not by any means a protection against rain. A car side with this kind of paint on it readily absorbs water after a shower of rain, and takes considerable time to dry, as the paint holds the water like a sponge. A good paint must leave a gum when it dries out. Linseed oil has not a sufficient quantity of gum to begin with. Coal oil has no gum, and is without value as a paint oil. To add one gallon of coal oil to three of linseed oil, making four gallons of the mixture, means that three gallons are spread over a surface, which at least four gallons of linseed oil should cover. Theoretically, the life has been reduced by one-fourth, but in practice the shortening of the paint's life is greater than this.

Paint should be considered, not as one substance, but as composed of oil and pigment, and to have an ideal paint both ingredients should be of the best. Lake Superior iron ore has in it about 80 per cent. of metallic iron, while Southern ores come nearer 20 per cent., consequently the former makes the better pigment for freight car paint, considered not only as to life, but also as regards appearance, it having a good red color. Southern ores make a dirty brown color, due largely to the clay they contain, known as "Tennessee mud." In good freight car paint the oil and the pigment both must be free from acid and alkali.

Freight Cars Have Reached the Safe Limit of Weight

Locomotive Engineering, Dec., 1900, p. 522.

The indication that the safe limit of weight for freight cars at 80,000 and 100,000 lbs. has been reached, is the trouble experienced by one of the leading roads which uses the heaviest cars. The metal at the base of the wheel flange becomes deteriorated by the great pressure put upon it, and this weakens the flange foundation. In some cases a large section or the entire flange breaks off—heavier wheels not remedying the trouble. Those who have given the subject close study do not believe that steel-tired wheels will carry the weight with safety. The limit appears to have been reached with cars carried on two four-wheeled trucks.

Fifty-Foot Composite Corridor Carriage, Midland Railway

Railway Engineer (London), Oct., 1900, p. 308.

Mr. T. G. Clayton, M. Inst. C. E., carriage and wagon superintendent of the Midland Railway, has furnished drawings and a description of the newest composite carriages turned out of the company's works at Derby. These carriages have central end doors and vestibules similar to those used in the United States, and the compartments are all placed on one side, with the corridor or passage running down on the other side. The passage is like that in a Pullman car, where it is placed at one side, so as to enable persons to get by the smoking compartment, with this difference that in the British carriage it runs the full length of the vehicle. There are six compartments in the coach—one for luggage, two marked first class and three third class.

Passenger Trucks and Coach Weights

American Engineer and Railroad Journal, Dec., 1900, p. 338.

"What Motive Power Officers Consider Important":—

How to improve the passenger car truck is one of the questions of the day. The increasing weight of passenger cars renders this question important. A weight of 125,000 lbs. in a new Pullman car is not encouraging to those who have to furnish power to keep fast trains up to schedule, especially

when such an increase is unjustifiable. There is a tendency to question the value of the equalizer in passenger trucks, and it is not improbable that a new design will soon be forthcoming with springs over the journal boxes. It is acknowledged that heavy cars ride smoothly. It may be possible to attain the same smoothness by the use of improved spring suspension with very much lighter cars. In a list of Pullman cars on the Burlington road there are five weighing 124,000 lbs. each and four weighing 120,000 lbs. These passenger car weights have apparently increased without attracting attention.

A Simple Body Bolster

Railway Age, Nov. 9, 1900, p. 375.

Mr. H. S. Bryan, master mechanic of the D. & I. R., has designed and patented a simple form of body bolster, applicable to car sills, of channel form or to wooden sills. The principle of the bolster is that of the deep truss, and in hopper bottom cars can be made of plates or a combination of plates and rods, which it is claimed will be more rigid and durable than the ordinary two-plate body bolster. It is applicable, of course, to other kinds of cars, and is said to be only moderately expensive.

Load Carried by Norfolk and Western 50-ton Cars

Railroad Gazette, Dec. 7, 1900, p. 803.

Mr. W. H. Lewis, Superintendent of Motive Power of the N. & W., in a letter to the Railroad Gazette, gives the weights carried in some 20 coal cars of 50 tons capacity. The figures are taken at random from the company's reports of train lading on Nov. 22, and show the average weight carried by these cars to have been 103,910 lbs. This average is derived from actual service loads. Occasionally cars have been reported as carrying as much as 109,200 lbs.

Scottish Dining-Car Trains

Locomotive Magazine (*London*), Sept., 1900, p. 137.

The new corridor dining car trains for the east coast route to Scotland were put into service on the 1st of August last. The dining cars are of the standard Great Northern design in every detail, and the other coaches built at York and Doncaster are all appointed in the same high class manner which has placed the east coast stock second to no other rolling stock in the country. These splendid trains, the latest addition to the long list of corridor trains running on the three trunk lines between London and the Scottish cities, may not only claim to be the most up-to-date from the passenger's standpoint of view, but embodying, as they do, such contrivances as automatic couplers, self-adjusting vestibules and the quick action Westinghouse brakes, may also claim to hold the first place from a mechanical point of view.

Maintenance of Way, Bridges and Buildings

Steel Ties from Old Rails

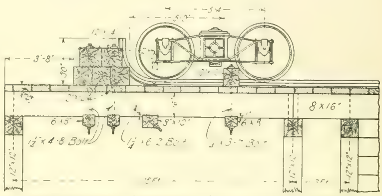
Railway Age, Nov. 30, 1900, p. 429.

Mr. C. Buhrer, roadmaster on the L. S. & M. S., has invented a steel tie for track work which has been tried on the Sandusky division of that road. The new ties consist of old rails re-rolled so that the head of the rail is made flat, the finished tie being in the form of an I-bar with wider flange below. The idea is to use up old and worn out rails in this way, and so enable railway companies to get from 25 to 30 years more service out of the material which they originally bought as rails, and at the end of that time they will have the value of the scrap, which will equal that of the worn out rails before being used as ties, less, of course, the loss from rust. It is suggested that roads which, by their location, can only get soft wood ties, might advantageously alternate the old rail tie with the wooden ones, say three or four of them to the rail length. This, it is said, would hold the gauge and make the track secure from spreading. Experimental ties were put in on the L. S. & M. S. on May 1, 1900, and on Oct. 16, when carefully examined, were found to have held the track accurately to gauge.

Standard Bumper for Ore Docks—Duluth and Iron Range R. R.

Railway and Engineering Review, Dec. 8, 1900, p. 686.

A very simple and apparently solid bumper for tracks on trestles has been designed by Mr. W. A. McGonagle. It consists of three heavy timbers, 12 in. x 12 in., placed close together across the track upon which two 12 in. x 14 in. are



STANDARD BUMPER FOR ORE DOCKS, D. & I. R. R. R. FIG. 1 ELEVATION.

laid so as to break joints; the whole is bolted and anchored down to the stringers. The rails are curved up against the timbers at a radius of 23 in. A timber or chock 10 in. x. 12 in. is bolted down on the track just far enough in front of the main bumper, that when the first wheel of a truck has passed over it, the chock will engage the second wheel at the same time that the main bumper is encountered by the first wheel.

Boiler Explosion on the Chicago and North-western.

Railway and Engineering Review, Dec. 8, 1900, p. 690.

At 5 o'clock on the evening of December 3 a boiler in the power plant of the C. & N. W. Ry. exploded. No details regarding the cause of the explosion are given. The exploded boiler was broken in two and thrown in two directions, one end striking another boiler and knocking it off its foundation. The other end penetrated the wall of the building and flew over a space of about 150 ft., when it passed through the top of a Pullman sleeper in a moving train and fell on the far side. Six people were killed outright by the boiler and six people in the sleeper were injured. The explosion put out the lights in the station, for which the power plant supplied the electricity, and otherwise temporarily paralyzed the working of the terminal. Coming as it did at 5 o'clock in the evening, when the heavy suburban traffic was just beginning, the accident imposed a very severe test upon those engaged in handling the business. The suburban trains though late were dispatched, and by seven the next morning things were practically at the normal point again.

The Strengthening of Two Important Bridges

Railway Age, Nov. 9, 1900, p. 366.

The Michigan Central double cantilever bridge over the Niagara Gorge is being made very much stronger than it was originally. This work has been rendered necessary by reason of the great advance in the weight of locomotives and trains since the bridge was built.

It was erected in 1883, and was then expected to carry two trains moving in opposite directions at the same time over its double track, each composed of two engines weighing 66 tons each, and with trains equal to 2,000 lbs. per lineal foot. The bridge as strengthened will sustain two trains each headed by two locomotives of 150 tons each with corresponding increase in the rolling load per foot.

The method of accomplishing this result has been to build

up, within the existing towers, which are composed of four legs—two additional legs in the center, making the reconstructed towers each possessed of six legs. The new tower legs are very much heavier than any of the original four. Upon the top of the two recently constructed legs in each tower rests the center of a new truss which extends across the chasm between the original trusses, just as the new legs stand midway between the four old legs. The clever engineering work required to cut openings in the ties through which to lower the new members and the cutting and supporting of the floor beams are given in full detail with half-tone illustrations in the article, together with details of the overhead traveler used to do the work, which was accomplished without stopping the traffic. The original bridge had all been hand riveted, while the new truss, weighing three times as much as the old ones, was put together with rivets driven by compressed air. The anchoring down of the shore ends of the central truss, which is a feature of all cantilever bridges, was successfully accomplished, the "anchors" being down about 14 ft. lower than the ones which secured the original cantilevers. The bridge is 910 ft. long, and the distance between the towers is about 500 ft.

The designer of the new work is Mr. Benjamin Douglass, bridge engineer of the M. C. His assistant on the work is Mr. G. C. Tuthill. The superintendent in charge of the work is Mr. David Coughlin. The Detroit Bridge Works have furnished part of the iron used, the Michigan Central Railroad doing the work.

The reconstruction of the Erie Railroad bridge over the valley of the Kinzua Creek consists of replacing an old structure with a new one. Traffic on the division in which the bridge stands has been stopped since last May. The old bridge was built in 1882, and was a special type of steel girder viaduct, called from peculiarities of construction the "stovepipe bridge." In the old bridge there was 2,500 tons of steel, while the new one will have, when completed, 3,500 tons. The old abutments, ties and guard rails have been employed in the new construction. The height of the bridge is 301½ ft., and it is 2,053 ft. 1 in. between abutments, or 2,100 ft. over all. Each of the new towers has two bents of two columns each. Latticed struts are used to stiffen the bents. The slope of the towers is one in six, which gives those at the center of the bridge a spread of 102 ft. 10¾ in. The bents in each tower are 38½ ft. apart, and the panels, or spaces between the towers are 61 ft. wide. The old-fashioned trestle construction gives way to web-plate steel girders of ⅜-in mild steel, 4 ft. 6½ in. deep over the bents. Over the spaces between the towers, the girders have the same thickness of plate, but are 6½ ft. deep. There are 10 expansion joints in the bridge, and the weight of the girders is from 8 to 10 tons.

The new bridge was built by the Elmira Bridge Company from plans made by Mr. Buckholz, chief engineer. The contract for removing the old bridge and building the new one was awarded the Messrs. Grattan & Jennings, of Buffalo.

Grand Central Station, New York

Railway Age, Nov. 16, 1900, p. 389.

The new waiting room in the Grand Central Station was opened on Oct. 20 last. The room is 90 x 180 ft. in size and 35 ft. high. Between the waiting room and the trains extends a concourse 30 ft. wide, and the full width of the station, with entrances from the waiting room, and from Vanderbilt avenue on the west and Depew place on the east. The bureau of information is placed in a convenient situation opposite the 42d street approach. Apartments for women, telegraph office, ticket offices, news stand and all other necessary adjuncts of the waiting room are to be found in suitable and convenient locations.

Icing Plant of the "Burlington Route" at Hannibal, Mo.

From a paper by Mr. Harry Miller, Assistant Superintendent, before the St. Louis Railway Club.

The new Burlington icing plant at Hannibal has been designed with the view of enabling cars in transit to be re-iced quickly. The building, divided into three compartments, has a total capacity of about 3,000 tons of ice. These separate compartments prevent the circulation of air through the whole building when ice is being taken out of one.

An icing room in the upper part of the building, about 7 ft. above the car roofs, is devoted to the work of breaking up ice and loading it in small ice carts previous to the arrival of a train. A room immediately below and on the level of the car roofs is used for salt. When a train arrives the little ice carts are run out on a platform, and their contents discharged directly to the cars through chutes; at the same time attendants mix in the salt, and as it is possible to work on six cars at once, the time occupied in re-icing a train is comparatively short.

Roadmasters' Association

Eighteenth Annual Meeting, Los Angeles, Nov. 13-14, 1900.

Railroad Gazette, Nov. 23, 1900, p. 770.

The Committee on the "Use of the Plugs in Hard and Soft Wood" is of the opinion that a spike driven in the tie plug, more particularly in soft wood ties, holds with more than double the adhesive force with which it held when first driven. The reason given is briefly that when a spike is first driven, it displaces and carries down a sufficient quantity of fiber to allow the spike to be partly unsupported. When driven into a plug it enters lengthwise of the grain, and simply compresses the fiber about it and so increases its holding power. Cedar and pine are totally unfit for plugs. Elm is preferred to oak, because when pressure is applied to elm, as in driving in a spike, it develops a rough surface, while under the same conditions oak develops a smooth surface. Oak is heavier and more costly as regards material and transportation. Ash is very like oak, as far as its qualities go.

SHOULD SWITCH POINTS BE REINFORCED?

The subject, "Should Switch Points Be Reinforced?" was dealt with in a paper by Mr. H. W. Church, in which he maintained that they should be reinforced. His opinion was concurred in by those present, and a letter from Pettibone, Mulliken & Co. was read, which further supported this view. This firm, however, distinguished between straps, which do not really reinforce, and are often a source of weakness and a form of construction which serves to maintain the rail in its normal position, and to effectually stiffen the point. Their "channel switch" was mentioned as such a construction.

"SHOULD POINTS BE HIGHER THAN STOCK RAILS?"

The majority of those present were in favor of making the switch point level with the stock rail. Messrs. Pettibone, Mulliken & Co., in a letter on the subject, say that when wheel tires are new and points higher than stock rails, the point carries the load, although it is the weaker member. The arguments in favor of having point and stock rail the same height are that when wheels are new the stock rail bears the greater part of the load, and when the wheels are worn and have double flanges the stock rail still takes the wear and so protects the points at their weakest section.

REVERSING ALTERNATE BOLTS IN RAIL JOINTS.

Mr. W. G. Merrell, of the Norfolk & Western, in an interesting paper presented three good reasons why alternate bolts in rail joints should be reversed. First, because when put in with heads all on one side of rail, the shoulders on the bolts which fit into the angle bar slots, throw a large proportion of the strain due to expansion and contraction on one angle bar, which frequently results in the bolts being broken. Alternate reversal of bolts equalizes this strain. Second, reversed bolts enable track layer to place a head so as to clear a spike. When bolts are all placed similarly in each joint it often happens that a nut will completely cover a spike and interfere with the proper driving or the removal of the spike. Third, with nuts all on one side of rail and heads on the other, a derailed pair of wheels is more than likely to shear every bolt for a long distance, and if the gauge is distributed a disastrous wreck may be the result. Staggered bolts at rail joints have the advantage of only preserving every second one from the action of the derailed wheel, and damage to line and gauge is less likely to follow.

Signaling.

Meeting of Railway Signaling Club, St. Louis, Nov. 13.
Railroad Gazette, Nov. 23, 1900, p. 765.

The committee to investigate automatic signal failures due to lighting made a report summarizing 17 replies received in reply to 25 inquiries sent out. Lighting is most severe on signals where there are flowing streams or large bodies of water, and especially where trees grow along the shores. It is also severe on signals placed near ravines and valleys, where air currents converge. Mineral districts are said to be noticeably affected. The report does not offer any definite conclusions concerning the value of arresters and fuses, and opinion differs as to whether instruments are ever damaged by atmospheric electricity which reaches them through the rails. In recent installations larger ground wires are said to be used. Signal wires should be placed on telegraph poles, a separate line of poles being found to be only a useless expense. The use of cables for signal circuits is not desirable, more trouble from lighting and from malicious tampering having been experienced with cable than with a line wire on poles.

Mr. Adams' paper (reported in Railroad Gazette of Nov. 9) was discussed. The question of mathematically demonstrating the economy due to the use of block signals was answered in the negative, for the reason that the accident record of any road is not often published. Two cases, however, were cited; one recent one of a single track division 75 miles long with steep grades over which 70 trains passed daily, now in good shape, on which collisions were formerly so frequent that passenger trains were not even expected to be on time. On another road the use of block signals had reduced the freight collision record from one a week to two in six years.

One prominent member stated that on his road the executive officers had become so thoroughly convinced of the superiority of the space interval over the time interval, that where block signals were not yet used, they had increased the time interval for all trains to 10 minutes.

The discussion of Mr. Sperry's question, "When should the distant signal be placed on a separate post, and when on the same post as the home?" brought out opinions as to what it means to run under control. The most definite views were expressed by Mr. Rosenberg, who has 200 or 300 miles of Hall signals on his line. His block sections on three divisions vary from slightly less than one mile to 1.4, and his distant and home signals are on the same post. Entire satisfaction has been experienced with this arrangement, and sections of special passenger trains have been enabled to follow one another for over 200 miles without ever being stopped or getting too near each other.

One member, whose road runs very long and heavy trains on steep descending grades, has found that when such trains are stopped, there is difficulty in getting brakes in hand in less than a mile. He raised the question whether, under such circumstances, a stop signal might not be passed if the way was seen to be clear and progress made at some very low rate of speed? It was stated that on the Boston & Albany and the Central of New Jersey a train finding a home signal at stop might proceed under the above conditions. On the Pennsylvania and the Lehigh Valley a signal set at stop requires the train to remain at rest for one full minute.

In the discussion concerning derailing switches the general opinion appears to have been that where strict discipline is maintained derails are unnecessary. In Massachusetts, it was stated, derails were being taken out, good discipline being found sufficient to keep enginemen from running through them.

American Practice in Block Signaling

By B. B. Adams—*Chapter X—(Continued.)*
The Railroad Gazette, Nov. 23, 1900, p. 777.

No new clockwork signals have been put in since 1894. This means that other kinds have found more favor with railroads. The track-circuit was always in favor from the first on account of the fact that, by it, broken rails were usually detected, and the breaking in two of a train did not affect its operation.

The electro-pneumatic system, which appeared after the clockwork system, made slow progress on account of its greater cost. The clockwork signals of the B. & A. set the danger position 200 ft. in advance of the entrance of the block. This arrangement is theoretically objectionable, because it forces an engineman to run past a signal which is at stop. Also a signal might be in the act of moving to the stop position, for some legitimate cause just at the time the engine arrived at the 200 ft. limit, and the engineman would be most likely to imagine that his engine had operated it. The objection to all signals which show the "danger" after the engine has passed is that the man on the engine cannot tell if the signal has operated to protect his train. The "normal-danger" arrangement is said to obviate some of the objections to setting the signal behind the engine. The B. & A. and the Central of New Jersey permit a train to proceed past a signal set at danger if the road is seen to be clear, but at a very low rate of speed. The Pennsylvania and the Lehigh Valley require a full minute stop at a signal showing stop. All these roads except the B. & A. have distant as well as home signals.

Eternal vigilance is the price of satisfactory block signals, as they may often stand at stop when no train is in the block. A broken rail is as dangerous as an obstruction, and its detection by the signal is most desirable, yet many causes, such as a broken wire, a bad connection, a broken spring in the switch-box, the failure of battery or relays, the breaking of a battery jar, rust in the holes in the rails for wire connection, or cinders on the track causing a heavy leakage of current may each make the signal inoperative without there being any real danger ahead.

The worst failures are when a signal shows clear when it should show stop. Exposed signals which can be frozen in one position are objectionable for this reason, but enclosed signals where the mechanism cannot be affected by wind, rain, snow or ice, render this cause of failure very remote. The enclosed signal held at clear by an electro-magnet which, upon the breaking of the current drops by gravity to the stop position, has much to recommend it, as the disc can be made of silk or other light fabric stretched on a metal ring, and a small colored glass can, by this same movement, be made to pass in front of a light for night service.

This form of signal may be obscured by a coating of sleet or snow, or made difficult of recognition by the sun's rays in a certain position, but officers of railroads using these signals do not seem to regard delays from these causes as very serious.

Passing Signals at Danger.

Transport (London), Dec. 7, 1900, p. 496.

Mr. Wilfrid Boult's system of signaling without contact is said by Transport to be the most complete of its kind. It consists of a case containing miniature semaphores or other preferred form of indication, carried in the cab and before the eyes of the driver, whose attention is called to any change in the signals by bells. The signals are operated by permanent magnets and electro-magnets placed on the permanent way.

The magnets on the road act in conjunction with armatures on the engine, the armature not being moved by the magnet, but containing a small polarized pivoted needle which is strongly moved on one side by magnetism collected by the rigid armatures moving past the fixed road magnet. "This system in its simplest form necessitates the provision of magnets only at points where distant and home signals are now placed; but on lines where the matter is of sufficient importance intermediate electro-magnets may be placed at intervals for the purpose; for the sake of notifying the fact if the signal is taken off by the time the train reaches each such intermediate magnet."

Grand Trunk Betterments, Etc.

Railway and Shipping World (Toronto), Nov., 1900, p. 327.

The Grand Trunk Railway of Canada is establishing a coal plant at Portland, Me., capable of storing 3,000 tons. Coal will be handled from vessels to cars or bins by "clam shells." The cost of the plant is between $60,000 and $65,000. Level crossings in the city of Montreal are to be abolished, as far as pos-

sible. Tracks are to be raised and sub-ways constructed at important points. The Pottawatamie bridge, near Owen Sound, is to be replaced by a steel through girder, 98 ft. long. At Port Credit, on the Toronto-Hamilton line, the bridge over the Credit River is being raised, and the track on each side of it is also being raised, which will remove two grades from the line.

Double tracking is being done between Hamilton and Niagara Falls, a distance of about 43 miles. Track is being raised, curves straightened and a new bridge will be built over the Jordan River.

Improvements are being made at many main line and branch line points. The superstructure of the International bridge at Buffalo is being wholly renewed.

Double tracking the Chicago and Grand Trunk Line is progressing, and it is intended to reduce some heavy grades on this line.

A short line of 18 miles on the Central Vermont is being built from Farnham to Freleighsburg. A line was in operation over that route 25 years ago, but was abandoned.

C. P. R. Betterments, Construction, Etc.

Railway and Shipping World (Toronto), Nov., 1900, p. 328.

On the Atlantic Division of the Canadian Pacific heavy rains fell in New Brunswick during the days of the early fall. A number of very serious and extensive wash-outs were the result, and some trestles were very badly damaged. It is said that repairs due to the heavy rains will amount to nearly $100,000.

The Windsor Street Station, Montreal, where the head offices of the company are situated, is being enlarged.

On the Toronto and Montreal line a road is being surveyed from Claremont to Agincourt, a distance of about 17 miles, for the purpose of reducing the gradients.

The Hotel Frontenac, the company's palatial hotel at Quebec, is to have a large extension.

The new Union Station at Ottawa is nearing completion. The design is described as being of the modern American style, savoring considerably of the Romanesque.

Several branch lines have been extended. Plans have been prepared for extensive alterations and improvements in the Winnipeg shops and yards, etc.

Track laying from Proctor's Creek to Nelson, B. C., on the Crow's Nest Railway, has been completed.

Work has been begun on the Columbia River bridge in British Columbia. When completed it will connect Robson, the Western terminus of the line from Proctor on the Kootenay Lake, with West Robson, on the Columbia & Western Railway, giving communication over the latter company's line from West Robson to Rossland and from West Robson to Midway.

The Rebuilding of the Chicago & Alton

Railway Age, Nov. 16, 1900, p. 391.

The Chicago & Alton is undergoing a physical as well as a financial reorganization. Easement, curves and curves of longer radii are being used, and in one particular, just west of crossing the Missouri River, a change is made which will eliminate three curves and 167 degrees of curvature. Grade reductions are also under way; the maximum grades on the main line will be reduced to about one-half of the maximum, when the present management took hold. Sixty-one bridges have been renewed, and 39 more are now in progress. When all are completed 11,400 lineal feet of old bridges will have been replaced by new bridges and culverts. The new bridge over the Missouri River at Glasgow will be completed this year. About 52,000 tons of new rails and 620,000 new ties will be laid. Stone ballast has been used for a distance of about 20 miles on the double track section between Brighton Park to Lemont. Four new water tanks have been erected and seven new stand pipes have been put in, and a new plant for purifying water has been established at the main shops at Bloomington. Improved train and semaphore signals have been installed, four interlocking plants have been established at railroad grade crossings and nine are under way. A short portion of the line is being completely equipped with block semaphore signals, worked by track circuit. Fifteen miles of new track, laid as extension of passing sidings, have been laid and 23 miles more are in progress of construction. A new coaling station has been installed at Mazonia, Ill. Six new turntables have been put in and three 160-ton track scales have been purchased. The shops at Bloomington are to be remodeled; tools and machinery are to be thoroughly modernized, the expenditure to be about $350,000.

A second main track through Springfield, Ill., has been begun. The telegraph and telephone service have been enlarged, and two telephone wires have been strung between Chicago and Bloomington. Two new trains, consisting of ten cars, have been purchased for the Alton Limited. Twenty new passenger coaches, two café and smoking cars, two coach and chair cars, four coach and baggage cars, two coach and mail cars, built by the Pullman Company, have been purchased, and the old equipment has been modernized. The company has purchased 75 new locomotives, 67 passenger cars and 4,367 freight equipment cars. Altogether the Chicago & Alton will be brought up to the most advanced standards of modern transportation and efficiency.

The Emery Automatic Switch-point Lock, C. & N. W. Ry.

Railway and Engineering Review, Dec. 8, 1900, p. 688.

The lock devised by Mr. W. E. Emery, roadmaster, is an ordinary switch lock so modified that when placed permanently in connection the stock rail receives a hasp attached to the facing point rail. The ordinary switch key is used to open the lock, when the switch may be thrown. After the train has passed on, the point rails are simply thrown over, and this movement locks the track again for the main line. The device aims particularly at insuring the locking of the switch for the main line every time. The lock can be held open for switching by inserting the key, turning it three-quarters of the way round and leaving it there until before the switch is thrown for the last time. This lock may take the place of the lock on the switch stand, and so obviate the danger due to forgetfulness on the part of the man throwing the switch.

A Track Tamping Device

Engineering News, Dec. 13, 1900, p. 404.

A track tamping device invented by Mr. Frank Sheppard, of St. Louis, Mo., is shown in two cuts. It consists of two similar pieces joined at a common center. It works on the cant hook principle; the portion of the device which, if it were an actual cant hook, would be a straight piece, is curved so that, as the handles are worked up and down, the curved piece passes under the tie. This curved piece is formed with a tamping head of the usual form. A hook to correspond with each handle grips the tie, and keeps the device in place.

Conducting Transportation

Possible Economies in Transportation.

Railway Age, Nov. 9, 1900, p. 364.

Mr. C. B. Adams, superintendent of transportation of the Wabash and president of the Railway Transportation Association, in his opening address discussed some very interesting questions, which were also dealt with in the reports of the committees on loading freight cars to their full capacity, and on first and second choice methods of car hire. On the question of time or fast freights, the matter of economy comes in. Apart from the greater cost entailed in running fast trains over that of slow ones, other things being equal, the load of an engine running at high speed must be lighter than that of one running slower, and, as Mr. Adams says, "A few hours to the schedule means a few more cars to the train." Many good judges believe that the present speeds are the result of competition, and not the outcome of commercial necessity.

The enforcement of demurrage charges is looked upon with favor, and "has resulted in inestimable benefit to the gen-

eral public as well as the railroads," yet the detention of cars has not yet been reduced to its lowest terms. The Committee on Loading Cars to Their Full Capacity did little more than insist on the advantages of so doing. As to the method of settlement for car hire the straight per diem method is unquestionably the first choice, and the mileage per diem is the second choice, with, however, very considerable distance between them.

Safety of British Railway Trains: Passengers Killed and Injured in 1899

Railway Engineer (London), Oct., 1900, p. 293.

The Board of Trade report of accidents which have occurred in the United Kingdom during 1899 were 1,340 killed and 19,155 injured. The total number of passenger journeys, not counting journeys made by season ticket holders, was 1,106,000,000, or 43,000,000 more than in previous years. The proportion of passengers killed to those carried was, therefore, one in 7,139,948, and for injured the proportion stands one in 514,740. The proportions would have been higher if the 1,537,000 journeys of the season ticket holders had been included in the calculation.

Staff-System

Revue Generale des Chemins de Fer, Nov., 1900.

This is an illustrated description of the staff system of handling trains on the Southern Railway of France. It is an electric apparatus intended to prevent collisions on single track roads. The principle of the system is that no train must run between stations unless the engineman is in possession of a staff that is ordinarily held in an electric apparatus at the station. The system is familiar to American readers, but the details of the apparatus are peculiar to this road.

Relations of Freight Traffic and Rolling Stock

Railroad Gazette, Nov. 23, p. 776.

The revival of freight traffic after the fiscal year ending June, 1897, which was 20 per cent. in one year, is ascribed to the resumption of production by mines, manufactories, etc., which had been closed or not worked to full capacity. The following year (1898-99) a further increase of 8½ per cent. is recorded, due chiefly to new or enlarged enterprises.

The increase in 1899 over the traffic of 1894 was 52 per cent. This five years growth of traffic was more than the total freight transportation of France, Germany, Austria and Hungary combined, in the last year reported. The gain in the last two years is 30 per cent.

The increase of 30 per cent. in two years, however, only necessitated the increase of 1.6 per cent. in the number of locomotives, and only 6 per cent. in the number of freight cars. In the 52 per cent. increase since 1894 there has been an increase of only 7½ per cent. in the number of freight cars and 3⅝ per cent. in the number of freight engines. These figures do not represent the increase in the capacity of the rolling stock. The advance in capacity has been great, and there is considerable variation in the capacity of the cars now ordered, so that their number alone does not give a key to the capacity of the car stock.

Leaks in British Railway Operation

Railway Age, Nov. 16, 1900, p. 380.

The statement is made apparently on good evidence that roads in Great Britain do not, as a rule, make the most of the facilities at their command. A quotation from the pen of Mr. Thomas Woodlock, of New York, is given in support of this statement. Among other things he says: "Railway managers in England know how many train miles they are using, but they do not know the ton mileage produced. In other words, they do not know their car loads or train loads." This information is almost daily in the hands of managers in this country, and is used by them and their subordinate officers to follow up and increase the efficiency of the service. It is said that "until the railways have exhausted the active efficiency of their present plant and equipment nothing is to be gained by increasing the potential efficiency, by building larger cars and locomotives." No systematic effort, it seems, is being made to put the maximum loads behind the locomotives which they have.

Note on Rails

American Engineer and Railroad Journal, Nov., 1900, p. 336.

Captain R. W. Hunt, in his paper before the American Society of Civil Engineers, points out that large section rails are known to be inferior to those of lighter section, the cause probably being that the heavier sections receive less work in the rolls, and are also finished at a higher temperature than the smaller sections. In his judgment it is desirable to give the rail its finishing passes, after it has cooled slightly. He also speaks highly of the McKenna process of re-rolling old rails. Re-rolled rails promise better wear than new ones of heavier section. By this means a valuable piece of economy may be inaugurated.

Electrical Machinery and Appliances

Will Electricity Supplant the Steam Locomotive for Railroad Service?

Locomotive Engineering, Nov., 1900, p. 476.

The question which stands at the head of this editorial in Locomotive Engineering is answered very fully and very clearly. Each form of motive power has its appointed place and its legitimate field of operation, but between the two there lies "the debatable land," and the supremacy of either within this latter area is as yet undetermined. The steam locomotive is in undisputed possession of the long haul heavy freight and passenger service in vogue on the trunk lines of the country; and the doubt as to its ability to hold that field for an indefinite period of time is so remote as to be practically a negligible quantity.

To the electric motor as surely belongs the street car field. There is no question of the superior adaptability and economy of electricity here.

The field of railway transportation, which includes the elevated roads in cities and suburban passenger traffic, is the one in which the steam locomotive, holding its position rather by inheritance than as the result of competition, now feels the stress of rivalry. At the present time the elevated roads are installing the motor and discarding the steam locomotive, and the results of such change will be watched with keen interest by those who operate the passenger suburban lines, to see whether the locomotive will have to yield here as it is yielding on the elevated systems of transportation in cities.

Electric Locomotives on Main Lines

Transport (London), Dec. 7, 1900, p. 497.

Mr. W. Langdon, electrical engineer of the Midland Railway and vice-president of the Institution of Electrical Engineers, recently read a paper before that body on the supersession of the steam by the electric locomotive. Mr. Langdon thinks the matter is primarily one of profit and loss. He takes as the basis of his calculation a section of the Midland main line about 49½ miles long. He ascertains the number of trains passing two points each hour in a 24-hour day in July, 1900, and classifies them under four heads; each is accorded its full merit of speed. From this classification is obtained the tractive effort per train and the consequent mechanical and electrical power required to deal with one hour's work, which are respectively equivalent to 3,890 h.-p. and 2,905 kilowatts. Fourteen trains per hour is the average taken, and there being four tracks there are 3.5 trains per mile per hour per line of metals.

Mr. S. W. Johnson, locomotive engineer of the Midland Railway, supplied figures showing the average cost for drivers and firemen for 24 years. This figure amounted to an average of 2.65 pence per train mile, and that for repairs and renewals 2.641 pence per train mile. The first item stands 2.538 pence per kilowatt hour when changed over to the electrical side of the account. The repair and renewals item for electrical machinery is taken at 2 pence per train mile, or .0249 per kilowatt hour. Renewals of cables and contact rails .0249 per kilowatt hour, and the cost of generation of current equals .2023 pence per kilowatt hour.

The total cost is, therefore, .6726 pence per kilowatt hour, or 7.021 pence per train mile. Comparing these with Mr. Johnson's figures (all of which are not given) it appears that the cost per train mile for electricity would be 7.021 pence as against 8.943 for steam.

The Central London Railway

Tramway and Railway World (London), Nov. 8, 1900, p. 531.

The Tramway and Railway World devotes twenty-two pages to a description of this new electric rapid transit line, which was opened for traffic last July. The Central London Railway is at present 5¾ miles long, and runs from The Bank to Shepherd's Bush, with 11 intermediate stations, at points such as the Post-office, British Museum, the Marble Arch and others. There are electric elevators at each station, as the tunnel is from 50 to 100 ft. below the level of the street. The running time is 14 miles per hour, including stops, which brings the speed between stations up to from 24 to 28 miles per hour. At the power house steam is supplied by 16 Babcock & Wilcox water-tube boilers. The engines are six cross-compound horizontal condensing Corliss engines, made by the E. P. Allis Company, of Milwaukee. They are rated at 1,300 indicated horse-power.

The locomotives have each eight wheels, 42 in. in diameter, fitted with motors of 117 h.p. each—one motor on each axle. The locomotive body consists of a heavy steel girder framework on which is raised an iron structure which constitutes the driver's cab; the forward and backward portions sloping down for protection of the apparatus, look very much like the slope-back tenders used on switching engines in this country. In conformity with English practice the driver does not appear to have any seat, judging from the illustrations. The third-rail system is used.

An Electric Light Blue Print Machine

American Machinist, Dec. 20, 1900, p. 1,218.

This machine, as its name would imply, is a device intended to make the Blue Print Department independent of the weather. The machine consists of a cylinder of plate glass, made in two halves, the divisions being vertical. The tracings and the sensitized paper are wrapped round the outside of the glass cylinder, and are held in position with suitable springs and clamps with an outside wrapper of canvas. An electric arc lamp is lowered into the center of the cylinder, and the speed at which it descends is regulated by a clockwork mechanism, in which a pendulum with adjustable bob gives slower or faster descending motion to the lamp, as may be required by a large or small tracing. The machine is made in several sizes, each machine being capable of taking two prints at the same time.

Other attempts to use the actinic rays from electric arc lamps have been made on flat surfaces. Such a method requires several lamps, and the lights being at varying distances from the paper, uneven prints have usually been the result. With the glass cylinder the light is at a uniform distance from the paper all the way round as it goes down and up, and is so concentrated as to require only one lamp. It is not surprising to learn that this evidently successful attempt to render blue printing independent of sunlight should be brought out in Pittsburgh. The Pittsburgh Blue Print Company of 1505 Park Building make these machines.

Electric Locomotives

Revue Generale des Chemins de Fer, Nov., 1900.

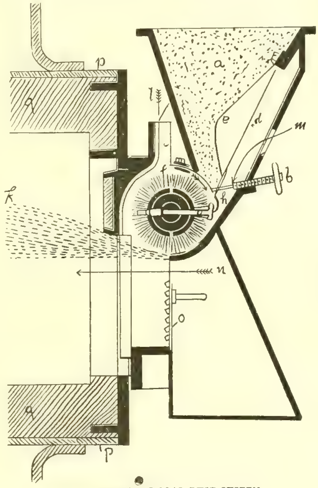
This is a complete illustrated description of the electric locomotives used for hauling trains from the Austerlitz to the Quai d'Orsay stations in Paris. These locomotives have a weight of 45 tons, and a total length over all of 34 ft. 10.8 in. The frame is carried on two bogie-trucks having four wheels each 49 in. in diameter. The current is transmitted by a third rail, contact being made by four shoes on the sides of the locomotive. A fifth contact is provided in a shoe on the roof of the cab to take current from an over-head line. Each locomotive is provided with four electric motors of a minimum power of 125 kilowatts under a tension of 550 volts. These motors have been made very large, so as to be able to sustain the stress due to the hauling of a train weighing 300 tons, exclusive of the locomotive, up a grade of 1.1 per cent.

Shop Practice, Machinery and Tools

Powdered Coal as Fuel

Modern Machinery, Dec. 1900, p. 216.

This article, after giving the early history of the attempts in England and elsewhere to burn "slack" and other forms of cheap fuel, fed to the furnace by mechanical means, goes on and details one of the latest efforts in this direction made by the Illinois Central Railroad Company at their Chicago power plant. The device is the Schwartzkopff system, and is being introduced by the Schwartzkopff Coal Dust Firing



SCHWARTZKOPFF COAL-DUST SYSTEM.

Company. By the pulverization of coal of a cheap kind, a hot flame with smokeless combustion is obtained. A brief description of the device is that it is in the first place a hopper placed in front of the firehole, or furnace door, with adjustments for regulating the amount of coal which passes in. A steel wire brush revolving just below catches the powdered coal, and by the action of the centrifugal force throws it into the fire-box in a steady stream. Air necessary for combustion enters just below, in a strong draught, and the result is a long continuous flame at high temperature, resembling that obtained from the combustion of oil.

Some New Things—Tools

American Machinist, Dec. 13, 1900, p. 1198-50.

The first of the "new things" spoken of is a pneumatic fret saw. The saw is attached to the piston of an ordinary pneumatic hammer, and is said to do good work. It is an ordinary keyhole blade saw, and may be made to follow most difficult lines, and it cuts rapidly. One of these saws is in operation in a Chicago packing house, where it is used for sawing ham bones, the saw in this case being a special one with very fine teeth.

The next novelty is a telescope air lift. This consists of an ordinary air cylinder with piston and hook attached thereto. The top cylinder containing the piston is itself made into a piston working within another cylinder. The area of the annular piston is greater than the area of the piston commonly used, so that when air is admitted the inner cylinder moves

bodily up within the other one, and when up it uncovers a small port by which the inner cylinder fills and its piston rises.

For lowering, the air is discharged so as to bring the inner cylinder down sufficiently to let its port communicate with the atmosphere and so empty itself and allow the piston with rod holding the load to come down; a further discharge of the air allows the inner piston to come down. When not carrying a load the two cylinders could probably be allowed to discharge at the same time and so come down quickly. In going up with a load the inner piston must always be drawn up within the outer one before the latter can fill with air. There is no reason why more than one inner cylinder might not be used. This telescope lift would be invaluable where maximum lift is desired with minimum head room.

A die of novel construction is next shown. It consists in four thread-cutting steel cutters placed in position, and held there by two plates depressed between each cutter and riveted together. This form of die has the advantage that better work can be done on the separate cutters before they are combined than can be done on solid dies, and the whole makes a piece of accurate, satisfactory and cheaply sold work.

The fourth "new thing" is a lathe tool with renewable points. The tool is in section a cross with each arm having the desired slope requisite for cutting V threads. The points of each arm are ground to the exact shape of the thread. The cutter is pivoted in the center of the cross, and the four arms can be used and the cutter turned upside down, and the other four points can be used before the tool needs sharpening. The sharpening is done by cutting down the worn section top and bottom, and it so equals eight separate tools.

A Chip Box for the Lathe

American Machinist, Nov. 8, 1900, p. 1,069.

In the column "Letters from Practical Men" appears a letter from Mr. Arthur H. Gang, in which he tells how he made and applied to a lathe a simple arrangement to catch chips, borings and lubricant. A box is hung by two pieces of ⅜-in. pipe on two rails made of two pieces of ⅜ x 1 in. iron. The rails are fastened to the lathe legs close under the beds with ½-in. cap screws at each end. The rig is inexpensive and very useful. Mr. Gang makes the suggestion that tool makers might improve upon his device and provide a substantial pressed steel box hung directly from the lathe bed, with some convenient method of dumping.

A Grindstone Convenience

American Machinist, Dec. 20, 1900, p. 1,219.

Mr. George J. Meyer's communication in the "Letters from Practical Men" column describes a convenient water-holding device for the ordinary shop grindstone.

The objection to keeping the stone in water when not in use is that soft spots develop in the wet portion if the wheel is partly wet and partly dry. The plan adopted is to make a semi-circular galvanized iron receptacle for the water and carry it up so that it just fits into the top of the frame. A treadle operates to lift the trough and submerge the lower part of the stone. When the foot of the operator is withdrawn from the treadle the trough sinks down so as to leave the entire stone clear of the water.

Miscellaneous

Railway Pensions

Revue Generale des Chemins de Fer, Nov., 1900.

The pension system in vogue on the Orleans Railway of France was inaugurated in 1844, and was intended to interest all of the employees in the success of the company, by stimulating their zeal and elevating them in their own eyes and those of the public. Its further object was to protect men who spent their lives in the service of the company from coming to want in their old age. On the first of January, 1863, a regulation was adopted that is still in force. According to this the company makes a yearly appropriation, proportioned to its dividends, that is to be distributed among the employees in proportion to their wages. Ten per cent. of this appropriation is reserved for the pension fund and deposited in the Caisse Nationale des Retraites, founded by the State. These pensions are made to cover all grades of service, and, under certain conditions, one-half the amount is made payable to widows and orphans.

Medical attendance is extended to all employees of the company. All sick and injured men have a right to the services of the physician free of charge, except where the incapacity is due to drunkenness, misconduct or diseases contracted before entering the service. Evening schools have been established for the benefit of workmen and apprentices, in which elementary instruction is given in reading, grammar, arithmetic, geometry and mechanical and ornamental drawing. One section includes the manufacture and use of materials employed in railroad shops. In order to lessen the living expenses of employees, the company has established stores at a number of places where the necessities of life can be obtained at a reduced price. A refectory has been built near the Paris shops where food is furnished to employees at a reduced price. There is also a bakery in connection with the Paris store where about 5,000 lbs. of bread of the best quality are baked daily. There are also co-operative bakeries in a score of places along the line.

For the past few years especial attention has been paid to the securing of suitable dwellings for the employees. The general plan adopted is to loan money for the construction of houses, a preference being given to co-operative associations of employees, whose object is to purchase land and build houses, the association agreeing to pay 3 per cent. interest on all advances, a mortgage being taken on the property as a guarantee. During the past ten years these advances have amounted to 850,000 francs, or about $170,000. The total cost to the company for the maintenance of the system amounts to about 11 per cent. of the cost of operation and 44 per cent. of the dividends distributed to the stockholders.

The same paper also contains a full description of a similar system in use on the Western Railway of France. From this it appears that the company has turned its attention from the very first to the maintaining of a high grade of service by assuring to their employees retiring pensions when they have finished their careers, and old age, exhaustion and sickness compel them to abandon active work. It was the first company to establish a home for incapacitated employees, and this was done in 1850. Various modifications have been made from time to time in the regulations for the support of this home, which is now done by a donation on the part of the company and an assessment deducted from the wages of the employees. There is also a system of pensions classified under different heads and based on the number of years of service and the cause of the incapacity for further work. One-half of this pension reverts to the widow in case the marriage took place at least two years before the granting of the same, the minimum amount to be paid to her being 250 francs. The pension reverting to the widow is also payable to the children less than 18 years of age. The article in question gives a very complete historical review of the various benevolent associations organized and controlled by the company together with a complete statement of the moneys paid for their support. As in the case of the Orleans Company, the Western also busies itself with furnishing supplies to employees at a reduced cost.

It has also established an asylum for the children of employees, which is under the charge of the Sisters of Charity of St. Vincent de Paul. This asylum includes a nursery, a mother's school, classes for girls and a professional school. The authorities of the asylum also devote their attention to providing sewing for the wives of employees, which can be done at home, and thus enable them to assist in the support of the family.

The situation brought about by the system is that the employee enjoys a fixed monthly salary, and is aroused to put forth his best efforts in the interest of the company by the premiums that are offered, and in the case of an emergency the company comes to his assistance either by loaning money on long time without interest or a direct contribution. In case of sickness he is attended by the physician free of charge. In old age a pension keeps him from want, and at his death a pension is paid to his widow or children.

Feed Water and Boilers

The Practical Engineer (London), Dec. 14, 1900, p. 566.

To illustrate the point that one type of boiler may give trouble where another type will not, comparison is made between a horizontal tubular boiler and one of the vertical type, both boilers being assumed to be of the same size, viz., 72 in. in diameter and 18 ft. long, having some 1,500 sq. ft. of heating surface. If these two boilers use the same feed water and evaporate the same quantity per hour, the total solid matter deposited in a given time will be the same in each. In the case of the vertical boiler most of the sediment will lodge on the tube sheet. In the case of the horizontal boiler it will be deposited anywhere over the lower half of the shell. Deducting the areas of the flues from the flue sheet we have 22 sq. ft. upon which sediment may collect, while in the horizontal the surface will be theoretically the half of the shell, or 170 sq. ft. The surface which will collect sediment is between six and seven times less in the vertical type, so that the sediment will be six or seven times thicker, and, further, it lies upon a sheet directly exposed to the action of the fire, while in the horizontal type it does not cover anything but the shell and the girth joints.

The flues of the vertical type, therefore, are much more likely to leak than are those of the other. If in the vertical the spaces in front of the hand holes are kept clean, the deposit will, roughly speaking, be massed in four heaps among the tubes which are separated by the clean areas in front of the hand holes.

There is here entered a disclaimer of an intention to condemn the vertical tubular boiler. It is merely desired to illustrate the general proposition that under certain conditions one type of boiler may be satisfactory both as to economy and durability, while others not so well adapted to the conditions may not be as satisfactory. To do this it was necessary to take some type, and the vertical type was selected for that reason only.

An Apparatus for Experiments in Impact

Extracts from a paper before the Paris International Congress for the unification of tests of materials by Prof. W. K. Holt and W. P. Turner.

Railroad Gazette, Nov. 23, 1900, p. 766.

A series of tests for the purpose of studying the behavior of iron and steel under impact in tension have been in progress in Purdue University for the past three years. The temporary machine used at first has been lately replaced by a permanent one of superior design and greater accuracy. The principle upon which the machine operates may be briefly summarized. It consists of an upright frame of two members between which slides a hammer, like that of a pile driver. In the impact testing machine the hammer, which weighs 515½ lbs., is suitably connected by the piece of steel or iron, to be tested, to a yoke which also slides on the guides. In making a test, hammer, specimen and yoke are raised to the desired height, and are let fall by the action of an ingenious piece of tripping mechanism. At a certain point in the fall the upper yoke is caught upon suitable supports and its motion stopped, while the moving energy of the hammer elongates or breaks the test specimen. A graphic record of the test is made upon a revolving drum upon which a pencil attached to the hammer traces what is called the velocity displacement curve, from which the deformation and the work of deformation of the specimen are obtained. A curious fact is mentioned, viz., the difficulty of bringing about rupture of bars at the center, in experiments at low temperature. An unturned bar 12 in. long frozen with ice and salt for 4 in. at the middle with exposed ends broke at one blow. Both ends were drawn down to a neck, while the frozen central section preserved its original diameter and length.

Interlapping of Railway Civil and Mechanical Engineers

Proceedings, Central Railway Club, Nov., 1900, p. 5.

Prof. H. W. Hibbard, principal of the School of Railway Mechanical Engineering, of Sibley College, Cornell University, read a very instructive paper on this subject before the Central Railway Club. Among other things he spoke of the practice on the Great Northern of rushing a grade. By approaching a grade at the rate of 21 miles per hour, if the grade be 1 per cent. 5,000 ft. long; that is, a rise of about 50 ft. in that distance. In such a case the momentum of the train will take it up 15 ft. of that raise, leaving only 35 ft. rise to be attacked by the engine. While on the subject of grades he called attention to a matter where the interlapping of the two great departments of engineering is peculiarly well seen. The combination of grade and curve and grade and tangent. The work of engine in going up a grade will be properly equalized if the civil engineer has, on the grade where the curve is encountered, lessened the rate of ascent, and increased it up to the normal, when the tangent is again reached. This compensation of grade and curve is of the greatest possible moment to the mechanical engineer.

The subject of tangents between curves is touched on. The case of a civil engineer was cited by Prof. Hibbard, who had been recently instructed by his company to go over the road and increase the tangent between all reverse curves to 500 ft. He also showed that the easement on the ends of curves had a positive commercial value on railways, as the public preferred to travel by a line which did not "roll you around in your berth." Prof. Hibbard seems to think the truly balanced locomotive can be obtained by using a 4-cylinder compound with two cylinders outside and two between the frames with a cranked axle in the center and Wolschaert valve gear. He was assured that the cranked axles used in England and on the continent do not break when properly made and with a wrought iron band shrunk upon the crank in the axle.

The balancing of car wheels and axles, unknown in this country, is done on some French railroads, the motive power men there having a very simple and satisfactory machine for geographically indicating how much weight is required for the light side, and the point to place it at. The result is a perfectly balanced pair of car wheels which do not pound on the civil engineer's rail.

In discussing the paper Mr. Pemberton Smith stated that the New York Car Wheel Works had for ten years past balanced the wheels which they supplied for passenger and locomotive service.

Mr. George W. West, the vice-president of the club, stated that on his road, the N. Y., O. & W., they had an engine known as the Strong balanced compound. It is a 4-cylinder engine, with two between the frames, and a cranked axle as described by the Professor.

Why We Are Beating European Manufacturers

Locomotive Engineering, Dec., 1900, p. 520.

American travelers in Europe, if connected with the industrial interests of their own land, are often asked why it is that, considering the high wages paid in America, our manufacturers are able to undersell those of the old world, especially in the metal trades? Many British manufacturers seek to explain the fact by pointing to hampering effects of trade unionism upon their industries. The reason given in the article before us is that American mechanics are given more scope to use their brains, to invent apparatus for doing work in new and paying ways, and generally to follow original methods. The presence in a manufacturing establishment in this country of an expert in no way interferes with or dwarfs the workman's right to think for himself independently, and he is usually encouraged by his employers if he shows any ability in that direction. The European workman is not only not expected to think, but is often told "you are paid for working, not for thinking." That the workman on the other side of the Atlantic is as ingenious and fertile in devising tools as an American is proved by the fact that many workmen dwarfed and repressed at home falls promptly into line as a thinker and inventor when he comes to work in the United States.

Educational Training for Railway Service

Railway Age, Nov. 9, 1900, p. 360.

The chief engineer of the Lehigh Valley has defined railroading, as at the same time a science, a profession and a trade. Special education for railway employment has been confined so far almost entirely to the engineering side. This is natural.

When railways were in their infancy the first great problems were those of construction for which proficient civil engineers were necessary, and from the supervision of construction they passed inevitably into positions of administration. Later the field opened to mechanical engineers, and to-day "the scientifically trained mechanical engineer holds no longer a disputed place in the railroad staff." Mr. Eaton, the United States Commissioner of Education, is of opinion "that perhaps the specialization of railroad work in university instruction has been more fully realized in the mechanical department than in the civil engineering corps."

The question next comes up whether men can be trained in schools for specific service in administration, especially on the commercial side, and the answer to this question is at present very doubtful. The University of Chicago sets forth courses in railway subjects in its "College of Commerce," concerning which the writer adds naively: "The graduates from these classes so far have become teachers, publicists, journalists and business men, but only a very few have gone into railway service."

More Experience with the Premium Plan

American Machinist, Dec. 13, 1900, p. 43-1,191.

The American Machinist not long ago sent out three questions to eleven representative firms using the Premium System. The questions were:

1. "Is it your opinion that the system can be profitably used in any manufacturing industry?"
2. "Knowing what you do to-day of this system, would you adopt it if you have not already done so?"
3. "Can it, to advantage, supersede the piece work and day wage systems?"

Ten out of the eleven firms replied, and all were in favor of the system. The letters came from the New England, Middle, Southern and Northern States, and from Canada and England.

Smoke Prevention

Modern Machinery, Nov. 1, 1900, p. 182.

Among recent plans adopted in England for the prevention of the smoke nuisance is one worked out by J. S. Vigelj, of Glasgow; A. D. Thomson, of Paisley, and J. S. McCowatt, of Langbank. Their plans provide for injecting hot air in the furnace gases just after they pass the fire bridge by means of a pipe extending from the flue to the boiler, where the air is turned in. The tube may be provided with a core and with an expansion joint, and its turned ends may be secured to the dumb-plate which secures the furnace bars. This arrangement has been given a practical trial, and is said to have accomplished very good results.

Important Discovery

Engineering Times (London), Oct., 1900, p. 342.

Experiments at the French Academy of Sciences, Paris, would indicate that the bioxide of sodium will soon be extensively used for all manner of submarine work. This substance is found to be useful in renewing the oxygen of air that has been breathed and of absorbing the carbonic acid gas exhaled. If the claims made are true, miners will not fear to enter foul or poisonous gases, firemen will be able to live and work in smoke and, the deep sea diver will be able to penetrate to greater depths than he can at present.

A New Theory of the Steam Engine

The Engineer (London), Oct. 12, 1900, p. 367.

This is a brief review of Commodore Benjamin Isherwood's position "On the compression of back-pressure steam into the waste spaces of cylinders," which is to be found in No. 3, Vol. XII. of the Journal of the American Society of Naval Engineers. Contrary to the generally received opinion, his first proposition is that compression can in no way promote economy. Commodore Isherwood says it is physically impossible to compress up to the initial pressure, and even if possible it would have no effect on the efficiency of the steam. Indicator cards, although they appear to contradict this statement, do not really do so. He states that the indicator pencil never can show, unless special precautions are taken where its rise, due to compression stops, and where that due to admission begins. If suitable means are used the card substantiates his statements. We now get the first intimation of the new theory. The writer says: "It has long been known that, provided a certain percentage of water is present in the cylinder, compression beyond a certain degree merely means the liquefaction of the steam. But Mr. Isherwood goes on to show that this liquefaction by augmented pressure must always take place." He contends that the cause of cylinder condensation is the expansive use of steam. He says: "That a part of the steam entering a working cylinder was liquefied therein has been known from the days of James Watt; the true explanation—the cause—is now given for the first time, namely, the superheating of the expanding steam at the expense of the heat in the metal of the cylinder which heat has to be restored to the metal from the latent heat of the entering steam at the succeeding stroke of the piston, no work being at any time obtained from this heat."

The Prevention of Smoke

The Mechanical Engineer (London), Dec. 15, 1900, p. 829.

A great deal is said in the daily press from time to time about the ignorance and wastefulness displayed by boiler owners in ejecting unburnt carbon from their chimneys, and the inventor is always on the watch to press the advantages of his particular patent upon the steam user at each prosecution for smoke nuisance. The fact that a good deal of black smoke may issue from a chimney is no proof that the boiler is not being economically fired, and a smokeless chimney does not imply nearly as much economy as the popular belief would warrant. An example of the difficulty of combining boiler efficiency and smoke prevention was exemplified in the course of a prize competition in which five stokers undertook to fire the same Lancashire boiler by hand, and as nearly as possible under the same conditions. The prize was offered to "the stoker who made the most steam with the smallest quantity of fuel and the least smoke." There were here three conditions, viz.: most steam, least fuel and least smoke. It so happened that the prize was not awarded for strict compliance with these conditions, for the stoker who evaporated the most water on the smallest quantity of coal in the given time made the most smoke, and was put at the bottom of the list. In this trial the man who got the prize evaporated 167 lbs. of water per square foot of grate surface per hour, and used one pound of coal to every 7.9 lbs. of water evaporated, and emitted black smoke for only 20 minutes. The man at the bottom of the list evaporated 200 lbs. per square foot of grate per hour, and evaporated over 9 lbs. water for each pound of coal, but the chimney during his period of work smoked for 90 minutes. The boiler in his hands was 20 per cent. more powerful, 13½ per cent. more economical, and the chimney more than four times as smoky. The smoke question is mainly a money question.

Firing by gas has been found to produce smokeless combustion, but costs too much at present. Mechanical stokers and forced draught appliances do offer very definite improvements over hand firing methods, and may reduce smoke production though they cannot do away with it altogether. The mechanical stokers provide for the continuous and light feeding of the fire, and the automatic shaking of the grates, so that the grate is kept cleaner and the fire more uniform. Forced draught arrangements permit of greater nicety in the control of the air supply, and so improves the combustion.

A Pneumatic Hammer Saw

Compressed Air, Dec., 1900, p. 1,112.

A novel application of a pneumatic hammer is shown in this periodical. On the end of the piston rod of a pneumatic hammer is placed a saw blade, which is reciprocated at approximately 1,000 strokes a minute, and in this way a pneumatic saw of very handy construction is made available. In the hands of a boy it is capable of doing rough work rapidly. It would likely be found very useful in the pattern shop; for cabinet work, wood carving or a hundred other similar uses.

Competition in the Steel Industry

Engineering (London), Dec. 7, 1900, p. 739.

In an editorial on this subject Engineering takes Sir Lothian Bell to task for some of his utterances in his inaugural address to the Institution of Junior Engineers. It appears that Sir Lothian does not realize the pressure which American competition is exerting upon the English steelmakers. He admits that "the mineral resources of Germany and the United States have enabled foreign mine owners to advance concurrently with ourselves in extended production." The speaker gives no credit to individual enterprise, and has no place for names such as Carnegie, Krupp or Schneider.

Engineering says: "This is not wholesome food for junior engineers. It is a national vice, to which we of Great Britain have always been prone, to undervalue our foes. We have suffered bitterly for it in the past, time and again, by sacrifice of blood and treasure on the field of battle, and now it is endangering our commercial supremacy. . . . He is no friend of the coming generation of English engineers the juniors of the profession who blinds their eyes to those portents of future industrial strife."

A Welding Compound

Trade Journals' Review (England), Dec. 15, 1900, p. 6.

A new welding and tempering compound has recently been patented by Mr. M. C. Dean, Niles, Ohio, who claims that an inexpensive compound is provided which will expedite and facilitate tempering and welding, and will also restore burnt steel so that it may be utilized for manufacturing processes. Furthermore, iron may be welded without being affected by the sulphur in coal or coke, so that an even smooth weld will be obtained. The compound is composed of pulverized borax, black oxide of manganese and carbonate of iron, all thoroughly mixed together. The best proportions are found to be at the rate of one pound of borax to four ounces of oxide and one ounce of carbonate. The welds are prepared and the compound is applied, after which the second heat is made, and in this heat the compound is absorbed by the steel. For tempering, a dark cherry-red heat is obtained, and the compound is applied, which penetrates and is absorbed by the steel, which is then forged.

Railroad Pension Plan

Railway World, Dec. 29, 1900, p. 1,462.

The plan of pensioning railway employees is finding favor with American roads. It is like the Brown system of discipline without punishment. It will probably grow in favor as its benefits become more and more recognized. The Chicago & Northwestern and the Chicago, Milwaukee & St. Paul intend to adopt the pension plan. The Northwestern is ready to begin with the dawn of the new century, and will closely follow the Pennsylvania's system.

The C., M. & St. P. will not be ready quite so soon, as its plan is in many respects similar to a mutual benefit association. The employees will be assessed at a certain per cent., and the company will contribute the remainder. Membership in the system will be voluntary. The Santa Fé will likely soon follow suit in adopting the pension system.

Canadian Competition in European Freight Traffic

Railway Age, Nov. 23, 1900, p. 416.

The completion of the Great Northern Railway of Canada, in connection with the Canada Atlantic Railway, opens up a competing route between the great lakes and Europe. The Great Northern operates 50 miles of the Quebec & Lake St. John Ry. from Quebec to Rieviere à Pierre. From that point west to Hawkesbury is the main line of the Great Northern, and at Hawkesbury it connects with the Canada Atlantic, which terminates at Parry Sound, on Lake Huron. The distance by rail between Parry Sound and Quebec is 570 miles. This is longer by 130 miles than the rail distance between Buffalo and New York, but there is a saving of between 400 and 500 miles in lake distance, and Quebec is considerably nearer Liverpool than is New York, so that a shortening of the lake and ocean route and a large saving of time over the all-lake route via Buffalo may be claimed with justice. A shipment of 230,000 bushels of grain carried by the S.S. Albanian was made over this route on Nov. 17 last. American capital is interested in the undertaking.

Canadian waterways are prepared to offer competition which may prove formidable as a result of the enlargement of the canals along the St. Lawrence. Sea-going vessels drawing 14 ft. can now pass through the Welland Canal and reach the ocean via the St. Lawrence.

Mr. Carnegie and others have made use of the Canadian route to demand lower rates between Pittsburgh and the Atlantic, and it is likely that a re-adjustment of rail rates will be brought about by the establishment of steamship service from the lake cities and the seaports of the world.

The Acetylene Flame

Engineering (London), Nov. 30, 1900, p. 710.

Some facts taken from a paper by Prof. E. L. Nicholls, which was published in the journal of the Franklin Institute, on the acetylene flame, are of interest. One of the facts stated is that the illuminating power of the gas falls off enormously if it is kept stored in a gas holder over water for any length of time. Gas stored in this way for five months only gave 6 per cent. of the light which freshly generated gas would give. The intrinsic brightness of the flame depends on the process by which it is generated. If this is done by dropping water on large masses of calcium carbide, the candle power of the resultant gas is only four-fifths as much as when fragments of calcium carbide are dropped in a large volume of water. The flame of acetylene gas is only about one-twelfth the size of the ordinary gas flame. To put it another way, the light-giving area of the ordinary gas flame is twelve times that of acetylene gas of equal candle power. Experiment has shown that the number of carbon particles per unit of area was not very different in the two cases. Much higher temperature is therefore attained in the case of acetylene gas. About 10.5 per cent. of the total energy radiated from an acetylene flame is in the form of light, while only 2.9 per cent. comes from an ordinary gas flame.

Pensions on the Pennsylvania

Railway Age, Nov. 9, 1900, p. 360.

The pension system which has been successfully tried on the Pennsylvania Railroad, will be extended on 1st Jan., 1901, to the western lines of that company. After that date all employees who have reached the age of 70 years, or who are between the ages of 65 and 69 inclusive, and who are physically disqualified, will be retired. Hereafter all employees reaching the age of 70 will be relieved from active service on the first of the month following the completion of that period. The amount to be paid by the company is one per centum of the employee's regular monthly pay for the ten years preceding retirement. No person, however, will be taken into the employ of the company who is over 35 years of age, except with the approval of the Board of Directors.

Protective Coating for Structural Material

Railway and Engineering Review, Dec. 15, p. 704.

In this article Mr. A. H. Sabin gives some interesting facts about the durability of various kinds of paints when exposed for a certain length of time to the continuous action of salt and fresh water. In reviewing the results of the experiments made, he says the general conclusion he arrived at was that the character of the pigment did not in most cases make very much difference in the case of pigment paints. Oil paints were very much worse than varnish paints. Of the varnish paints those containing large amounts of oil were in general the best. That is not absolutely so in every case. There are some varnishes—the 20 gallon varnishes—which have given very good results, but as a rule the varnishes containing 30 gallons of oil are better than those containing 20.

Mr. Sabin thinks that varnishes for the highest degree of durability should contain between 30 to 40 gallons of oil.

The rest of the article is devoted to a very instructive exposé of the methods of preparing boiled oil and dryers and to how paints are produced.

Railroad Paint Shop

Official Organ of the Master Car and Locomotive Painters' Association

A Department Devoted to the Interest of Master Car and Locomotive Painters

Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

M. C. & L. P. A. Portrait Gallery

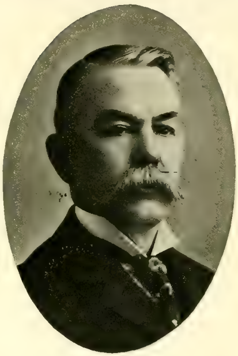
JOHN RATTENBURY.

It affords us much pleasure to begin the new year and the new century with a portrait and sketch in these columns of our esteemed associate, Mr. John Rattenbury, who, as a railroad master painter, stands at the head of the business, having been in charge of all painting on the Chicago, Rock Island & Pacific, including equipment, bridges and buildings, for many years. When we started out with this gallery of portraits, two or three years ago, we had him booked for second on the list, to follow the veteran, Warner Bailey, but we failed to get his photo, and now have a fresh illustration of the old saying, "The third time never fails," for he has now responded to our call. We can do no better than to let Mr. Rattenbury tell his story in his own words, as follows:

"My first experience of painting, when a boy of fourteen years, was at chair painting for one year. From that I went to be an apprentice at the Michigan Central shops at Detroit, under the leadership of a man named Thos. Choke, in the year 1853, and I served five years there. Mr. Choke was one of the best decorators in the country, and I took night lessons of him for three years, until I became an expert at decorating. Then Mr. Choke left the Michigan Central, and I went with him. We contracted to do the painting of passenger cars for the old Detroit & Milwaukee Railroad of Detroit, furnishing our own material and doing the work by contract. From that we started a carriage and 'bus paint shop. We ran that shop up to the time I left Detroit to come to Chicago.

"I came to Chicago for the purpose of decorating some sleeping cars for the C., R. I. & P. Ry. Co. by contract. This was in the year 1866. After I had got through with the contract and all was done that I contracted to do, they asked me to take charge of the shop. I accepted, and had charge of the car department for six years. After that I took charge of the car and locomotive departments for four years. Since that time I have taken charge of all the painting of every description done on the Rock Island system, i. e., the buildings, bridges, advertising work, and the furnishing and fitting up of all offices. I have been working for the Rock Island R. R. for thirty-four years, and it has been a very pleasant thirty-four years of my life, as it is one of the best corporations that a man ever worked for. They only expect you to do your duty, and as long as you do that they will stand by you."

Mr. Rattenbury joined our association in October, 1873, three years after its formation, and has been an active and honored member, having been twice elected president, namely, in 1883 and 1884,



JOHN RATTENBURY.

the latter at Young's Hotel, Boston, where we first met him.

Appended to the foregoing he gives in his letter some ideas on that vexed question of terminal car cleaning that are worth reproducing here, as follows:

"The great thing that is troubling many of our car men to-day is the cleaning of cars at terminals. There are a great many ways of cleaning cars, but you take a large corporation that has six or seven hundred cars, and it must be the quickest and best. The time has come when we can't take any man's paste and apply it to our cars and put two men to work on it and take them a whole day to clean it. It has got to be a system that is very quick and which will not injure the paint or varnish. The best system I know of to-day that will do your work satisfactorily is the formula I sent to the Secretary of the Master Car and Locomotive Painters' Association, Robt. McKeon. You are obliged to scrub the car and apply the material, letting it stand on the car about fifteen or twenty minutes; then take a car scrub brush and scrub off the car. Then wash it off with clean water. After that take Brooks' Renovator and dampen a piece of waste with it and wipe the car all over, and you will find you have a car cleaned and looking as good as new. One man can do two cars a day. I do this every three months, or four times a year, and the cars are washed at terminals as usual with water and a car-washer brush. We keep our cars in first-class shape, and they come into the shops in good condition for varnishing in from fourteen to sixteen months on the road. Try it and satisfy yourself. Anyone can come and see our cars at any point, and you will find that they are all cleaned in good shape. The varnish is also in good condition. That is all at present, but I hope to say more the next time."

Official Announcement

The Advisory Committee of the Master Car and Locomotive Painters' Association of the United States and Canada will meet at the Grand Hotel, Cincinnati, Ohio, on February 22d, 1901, for the purpose of selecting a programme of suitable subjects and topical questions for discussion at the thirty-second annual convention, to be held at Buffalo, N. Y., commencing September 10th, 1901.

The Committee desires the earnest cooperation of every member of the Association, and we hereby extend a cordial invitation to every member, who can conveniently do so, to meet with us.

Any suggestions offered will be highly appreciated and duly considered. All communications should be sent to the chairman not later than February 10th.

Fraternally,

JOHN F. LANFERSIEK,
Chairman of Committee.

Columbus, Ohio, December 10th, 1900.

Hotel Arrangements For the Buffalo Convention, Sept. 1901

We have received the following announcement from Chairman Vail of the Committee of Arrangements for the next convention, and hasten to insert the same in this issue, to set at rest any anxiety that members may have regarding accommodations to be had in that city, crowded as it will be on account of the Exposition to be held there. Now is the time to secure rooms—before they are built! Have one made to order! Better, go there and have one built around you, and then you will be sure of it, something that you were not sure of at Detroit, though you engaged it.

Mr. Vail encloses a handsome illustrated card with a fine picture of the hotel, "Statler's Pan-American Hotel," as it will appear, a cut of which we trust he will secure for us for a later issue. Don't worry; there will be room enough—"Accommodations for 5,000!"

Following is Mr. Vail's letter:

Chas. E. Copp.—Dear Sir: The Committee on Hotel Arrangements met in this city some weeks ago, and after due consideration agreed unanimously to accept the terms offered by Mr. Statler, who is at present erecting a large hotel near the Exposition grounds. He promises to accommodate from two hundred to three hundred or more people, if required (and furnish a convention hall in the same building free of charge), for from \$3 to \$5 per day, the second week in September, 1901. I have notified the Secretary, Mr. Robt. McKeon, and a few others. Hoping to see you at that time, if not before, I remain, Yours very truly,

D. B. VAIL,
10 Putnam Street, Buffalo

December 12, 1900.

An Interesting Letter on Several Topics

Editor Railroad Paint Shop:

In the November issue of The Journal there appeared "A Retrospect of the Convention." As a general proposition this was timely and terse (I won't charge you for this), but there are two exceptions which I feel should not go unchallenged, as they are capable of misconstruction. I refer to the reference to the unparliamentary course of our proceedings at Detroit, and the implied throttling of new members; and also to the selfish interest of some who participated in the discussion of "Terminal Cleaning." I take exception to both, from the fact that a casual reading of the proceedings by some one who didn't know just how modest, how retiring, how unassuming I really am, would cause that casual reader to jump at the conclusion that I was one of the offending members, especially as to the disregard of parliamentary usage in speaking more than once. I deny the charge! Every one who attends our conventions knows that, aside from "Bob" Scott, Frank McCullen, Henry Block and a few other young members (?), there is no member who is more reserved, sedate and circumspect of speech than myself, unless it be Count Von Waldersee Quest, and I don't feel like yielding the palm even to him.

Joking aside, Mr. Editor, I think you are wrong in the first proposition, that "We think the point the young man makes here is well taken;" and in the second proposition, as to the lack of harmony on the subject of terminal car cleaning, in which you say, "This comes largely on account of so many cleaners being on the market in which members are variously interested, and some of which they are the inventors of." As to the first proposition, what is the point this young man—a new member—takes? It was in relation to terminal cleaning, and he "deplored the lack of harmony on the subject and also the utter disregard of parliamentary usage in the proceedings." He was a presiding officer, etc., and members were occupying the floor when many others to his personal knowledge wished to speak. Now, Mr. Editor, you have been president of our association four consecutive times, and can you say there was any meeting at which any one was not invited, much less debarred, from taking part in any discussion? I notice in the report of our last meeting that several new members "butted in" in the discussions, and who held this young man who was a presiding officer himself, who was prevented from taking part in the discussion. I challenge contradiction of this assertion: "There is no railway association in the country to-day that lends more encouragement to its new and young members to participate in its proceedings than the Master Painters' Association." Ask the Advisory Committee as constituted in the past five years (and I have attended every meeting) if the paramount idea was not to bring out the new members; and, when they were invited to participate, how often did they respond? Ask our Secretary how many refusals he met.

Now, I want to say to that young man that youth is no more of a bar to prominence and advancement in the Master Painters' Association in 1900 than it was to Wm. Pitt in the last quarter of the eighteenth century. Coming down to our time, youth didn't bar Hobson from becoming the osculatory champion of his day. The junior Senator from Indiana, A. J. Beveridge, was barely of constitutional age when elected, but he didn't wait until he was a fossil before he was heard from. So this young man should follow their example and "let his light shine." If he does not he may prove that

"Full many a gem of purest ray serene
The deep, unfathomed caves of Ocean bear;
Full many a flower is born to blush unseen
And waste its sweetness on the desert air."

Come to the next convention, young man, and speak out in "meetin'," instead of telling your troubles to the editor. He has troubles enough of his own. I like young men. I was young myself one time, and it isn't such an "allfired" long time ago, either; not so long ago that I have forgotten to sympathize with the timid chaps who keep quiet and let the old-timers do all the "chin" work. The latter are not so anxious to bear all the burden as they were when "you and I were young, Maggie." The novelty has worn off. The applause falls flat, and they would gladly hail your advent at the breach. If you fail in your duty the old-timer will say, "Come wind, come rack, at least we'll die with harness on our back."

As to the second proposition, you say, quoting at length, "As to lack of harmony on the subject of terminal car cleaning, this comes about largely on account of so many cleaners being on the market, in which members are variously interested, and some of which they are the inventors of." This being the case, it is about as difficult to get an agreement on the best cleaner as it is to get an agreement on the tariff, etc. So many self-interests is where the chief trouble lies. If these could be all laid aside, which is doubtful, and men would look at the matter candidly and only in the interest of their companies, a different feeling might result. In this matter, as in all others in car maintenance, one should have no friends to reward, no foes to fear, in order to arrive at lucid and just conclusions." The above, Mr. Editor, is calculated to deceive some people, unintentional as I believe it to be. It would lead people to believe that the question discussed at Detroit was, Which is the best cleaner? And the natural inference would be that every one interested in a cleaner advocated his own; and, further, that only those interested in cleaners advocated them. The question discussed was, "Which is the best method of cleaning?" and the issue became soap and water vs. emulsions. Now, the soap and water men had no axes to grind, for they didn't invent the soap and water. Their natural inclination would be to assist the emulsion men, if the emulsion men were right. On the other hand, a number of emulsion advocates had no personal interest in emulsion cleaners, but advocated them from the same principle that was actuating the soap and water men, i. e., an honest belief that it was best for their companies and their own interests. Now, if you eliminate every word spoken by those who were interested, as you say, in the emulsion cleaners, you, or any one else, ought to be able to draw a conclusion as to the merits of the discussion. So far as myself is concerned, I wish to say I tried impartially to prove the relative value of the emulsion cleaners, laying aside all preconceived notions, all prejudice, taking your motto: "No friends to reward, no foes to fear." I think a careful perusal of the discussion will prove that no member who was interested in a cleaner advocated his own cleaner to the prejudice or in preference to any other cleaner. The question as debated was simply, "Which is best, a soap and water, or an emulsion cleaner?" Let every one draw his own conclusion, based on his experience with both methods, and then say to his people which is best, and then prove it. So much for cleaners.

I have "my fighting clothes on," Mr. Editor, and, like the Irishman at Donnybrook fair, wherever I see a head I am going to take a crack at it with my shillalah. I received a couple of weeks ago an anonymous printed circular ascribed to "Painters' Rough Notes." I don't know the periodical or journal. I regret that I mislaid it, for I would like to quote it truthfully and at length. However, it deprecated in no uncertain language the use of Sipe's Japan Oil, Linhuile and Lucol in the process of painting. If the author of this circular is right, then every master painter in this country who has used either of these products is recreant to the trust reposed in him by his employer and is not deserving of any consideration at his hands, and I am one who is willing to accept the gauge I have thrown down, for I am guilty. This article says these products are worthless—are detrimental—and any company indulging in their use is actually throwing its good money away. They say these are coal oil products, and cars painted with them soon lose their gloss and their life, and chalk or peel off. They may be coal oil products—I don't know; but if I can't prove that as good, if not better, results accrue from their use, and at a less cost to our companies than with linseed oil alone, then I will say I have been defrauding my company, or, in charity to myself, I have been mistaken. I have used one of these products for ten years, and have endorsed it on every occasion when my opinion was solicited. I condemned it in no uncertain language when I first encountered it. I had to endorse it after a fair trial, because it proved its excellence. Two years ago I was fortunate enough to be able to build for myself a little home, and, knowing its worth, I specified its use in the painting of the same. And I have no cause for regret on that account. One of the other two mentioned has been on trial at our Brightwood shops, exposed to the weather since April 19th, 1899, nearly two

years. I invite the author of that article to come to Brightwood and prove there is any difference in the appearance of the two panels so painted. As a reflection upon myself (if that article is true), I was asked by my superior, about three weeks prior to the receipt of this circular, what I knew of the article in question. I replied that I had a test sample at Brightwood and would advise him immediately on examination. I did so, as above indicated. He replied that if it was as good as I indicated, we ought to use it, as it would prove quite a saving to our company. Now, I either misrepresented the facts to my superior or I was mistaken, and I invite this unknown author to prove either.

A few weeks ago I was invited to inspect some three hundred samples of paint—"different combinations"—and report on same. Among them were some painted with linseed oil alone, others with linseed and Sipe's, linseed and Linhuile, linseed and Lucol. The owner of these had no interest in either, only to demonstrate which gave the best results. I believe I can get permission from the party to have an examination made. I invite the author of that circular to go with me and then demonstrate the superiority of linseed oil.

Mr. Editor, I believe I have been doing my duty to my company. If not, I am willing to be so convinced. In that event I will admit to my people that I have been misleading them.

J. A. GOHEN,

Master Painter "Big Four" Ry.

Indianapolis, Ind.

A Railroad Paint Shop Burned

Editor Railroad Paint Shop:

Saturday morning, December 8th, one of my paint shops was burned. I have two shops, one of seven tracks and one of five tracks. The shop burned was the five-track shop. In one end I had my stock room and varnish room for sash, blinds, etc. The fire was discovered about 3.45 a. m. In my color room I had several large tanks that I used for freight colors, etc., 300 gallons capacity, mixed by compressed air. The fire entirely destroyed every tool we had and all material of every description. I have about thirty-five men out of employment temporarily. We are working a small force of ten or twelve men in shop No. 2, until we can rebuild. We had nine passenger cars housed, but all got through safe but three, one mail and baggage, one passenger and baggage, and one first-class car, finished for service, and was to go in train Sunday morning. All my personal effects, tools, etc., records—everything was destroyed. All my men had their kits in shop No. 2. With the exception of my stock keeper and sash and blind men; they lost theirs. We are going to rebuild at once, and in a few days we will be in shape again.

I merely write this as an item of news, and you can give it such notice as you see fit.

Trusting you are well, and that I may have the pleasure of meeting you again in Buffalo in 1901, I am, yours truly,

GEO. R. CASEY,

F. P., A. C. L.

Wilmington, N. C., December 12, 1900.

NOTES AND COMMENTS

Elsewhere in this issue may be found the official announcement of the Advisory Committee's meeting. We note that it is to be held at the Grand Hotel, Cincinnati, February 22. They will be in luck; it will not be so hot as it was in September, 1895, when our convention was held there! A cordial invitation is extended to the fraternity round about to come in and sit with the committee. A special invitation is extended to me by Chairman Lanfersiek to be present. Thanks, but it's too far off and I am too busy. Pleasant memories linger around that place though, if it was hot. That's where I was first inducted into the president's chair on my forty-seventh birthday.

The Boston & Maine will soon have its entire passenger equipment of 1,483 cars equipped with platform gates in accordance with a Massachusetts statute passed at the last term of the Legislature, which takes effect January 1, 1901, and makes it a penal offence to run a car in a train without them. For some years this road has been putting on the gates at the recommendation of the railroad commissioners, and when the law was passed last summer we had only about 300 cars to equip, about half of which were on the newly acquired Fitchburg division. Wood's gate is the one that has been applied of late years and constitutes the bulk of the equipment, a few of another kind having first been applied years ago.

Our readers will be highly entertained by an interesting article in another column by Bro. Gohen, wherein he "pulls her wide open" and frees his mind on several subjects. Glad "Jim" has his fighting pants on; it makes our otherwise prosy columns breezy. Look out for his guns on "Terminal Cleaning" in our next. He may push Gen. DeWet (soap and water under Fred. Ball), with his Indian scouts under the "Modoc" chief, harder than ever before, if he does not actually capture a Coppje.

Riding in a first-class passenger coach of a popular line, December 18, a hundred miles, we find the creaking of the joints of its woodwork a wearisome and needless nuisance, resembling the noise of a flock of geese, with the discordant notes of an adjacent frog pond and the creaking of a hay-rack in addition. Are there not nails, screws and glue enough to stop such an intolerable noise? We have ridden in sleeping cars (?) afflicted with the same disease.

The above was not on the Boston & Maine, but the latter has a curve sharp enough entering its Union Station for some of its E. Div. trains to make the woodwork of any car creak, to say nothing of cracking the brittle paint and varnish on them.

On a popular trunk line recently the news agent came into the car with a magazine called "The Smart Set," and "just out," and thrust it into a passenger's face in each seat as he went through the car repeating its name and the fact that it was "just out" in each case. When this was over he did the same with "Pearson's" and with the "Pathfinder," which were also "just out." A man traveling on a pass should bear this and many other nuisances meekly, but we doubt it in the case of a man who pays his fare. The train peddler's business is overdone for the comfort of travelers. We merely throw out this hint "for the good of the service," as we do some others hardly in our line, hoping it will meet somebody's eye and do some good.

Announcements are out informing his friends and the trade in general that Mr. D. Frank Price has become a stockholder and has accepted the vice-presidency of the Palmer Price Company, of Newark, N. J., a concern composed of three varnish companies, we are informed. Mr. Price severed his connection with the Bigelow Varnish Company, with which he had long been connected, on Dec. 15. He was really born into the varnish trade and, as he said to the writer recently, "knows nothing else." His father, David Price, made and sold varnish to the railroad trade years and years ago. "Price & Bond's" varnish appears on the books of the B. & M. paint shop at Lawrence, Mass., between '67 and '72 when Warner Bailey was Master Painter there.

An official bulletin issued by the superintendent of motive power and rolling stock of the New York Central & Hudson River Railroad Company, and received just as this journal goes to press reads as follows:

"Mr. H. M. Butts, heretofore Supervisor of Passenger Equipment, is hereby appointed Master Car and Locomotive Painter, headquarters at West Albany shops, and will have supervision of the methods and practice in connection with painting and varnishing of the car and locomotive equipment of this Company. The position of Supervisor of Passenger Equipment is abolished. Effective January 1, 1901."

The letter X only occurs once in 1,000 letters in the English language. In French it occurs five times as often, says the Boston Globe. It occurs three times on the heads of many beer barrels in Portsmouth, N. H.

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

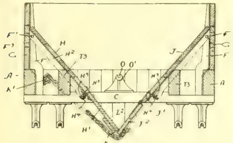
A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents the fixed Government charge.

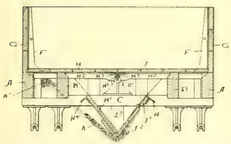
Convertible Dump Car

No. 664,268.

HARRY S. HART, of Chicago, Ill.

In a convertible car, the combination with the side stakes F, of changeable side hopper sections having transverse





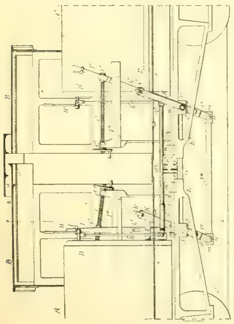
angle iron ribs, and means for attaching said ribs to said stakes. The car having fixed vertical sides and a hopper, the latter being removable and adapted to form the vertical ends of the car when converted from a hopper to a flat-bottomed car.

Locomotive

No. 660,433.

WILLIAM P. HENSZEY, of Philadelphia, Pa., assignor to Burnham, Williams & Co.

The combination of two locomotives coupled back to back, a shaft adapted to bearings on each locomotive, an arm on each shaft, one arm connected to the reversing mechanism of one locomotive, the



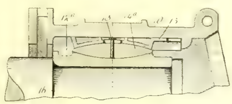
arm of the other shaft connected to the reversing mechanism of the other locomotive, independent reversing levers on each locomotive, and means for coupling one or other of the reversing levers to their respective arms, so that when the engine driver is at his post on one locomotive the reversing lever of the other locomotive can be thrown out of engagement with the arm connected to the reversing mechanism.

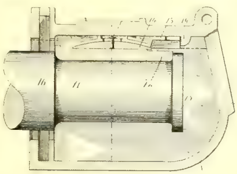
Bearing for Car Journal Boxes

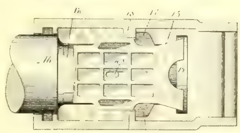
No. 663,094.

JAMES M. HOPKINS, of Chicago, Ill.

In a car journal bearing, in combination, a brass and a wedge member adapted to vary their angular relation in vertical plane, and a slidable member interposed there between, the wedge member being adapted to engage a journal box







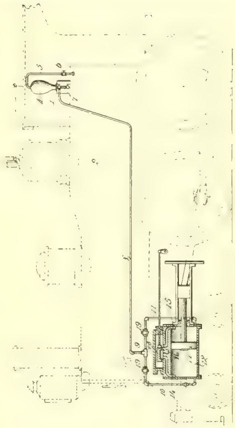
to prevent its forward movement, the brass being adapted to engage a journal box to prevent its backward movement, and the wedge and brass being interengaged to prevent the backward movement of the former and the forward movement of the latter.

Lubricating Device for Steam Engine Cylinders

No. 632,104.

ALLEN H. DINGMAN, of De Haven, Pa.

The combination with a boiler, an engine cylinder and a lubricator in communication with the steam space of the

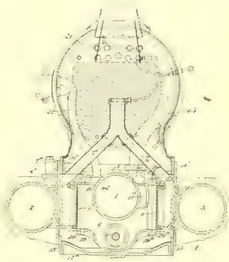


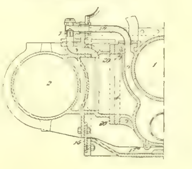
boiler, of a feed pipe leading from the lubricator and provided with branches that connect directly with a lower part of the engine cylinder at its opposite ends, and check valves for said branches of the feed pipe, whereby the feed of lubricant to the cylinder at its opposite ends, alternately, is direct at all times and without any obstruction or back pressure in the feed pipe or its branches.

Compound Locomotive Engine

No. 662,578.

WALTER MACKERSIE SMITH, of Newcastle-Upon-Tyne, England.





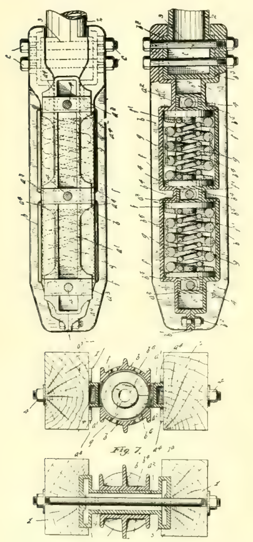
In a compound locomotive engine, the combination of three steam cylinders, one high-pressure and two low-pressure, a receiver forming the exhaust chamber of the high-pressure cylinder together with the steam chests of the low-pressure cylinders, passages 9, 9a respectively leading from the ends of the high-pressure cylinder, pipes 10, 10a connected to said passages 9, 9a and leading therefrom to accessible parts of the engine, passages 8, 8a leading from the receiver to said accessible parts, and non-return valves 7, 7a located at the junctions of said pipes 10, 10a and passages 8, 8a.

Draft Rigging for Cars

No. 663,463.

EDWARD POSSON, of St. Paul, Minn.

The combination with the integrally formed skeleton draft-bridge having integrally formed transverse beams a^2, of a draft-bar having a yoke or stirrup embracing the said bridge beams a^2, bolts passed through said bridge beams a^2 and the car beams to which said bridge is secured, and draft springs and followers compressed between said bridge beams a^2 and shoulders on the said yoke or stirrup.

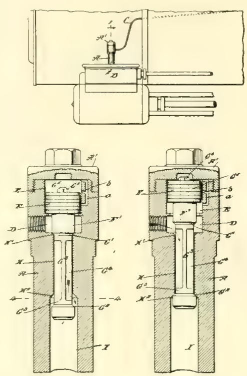


Lubricator

No. 648,821.

HARRY ROBERT WHITE, of Hartford, Conn.

A device of the class described, comprising a cylinder connected with a fluid-receiving chamber and having a port for connecting the ends of the cylinder with



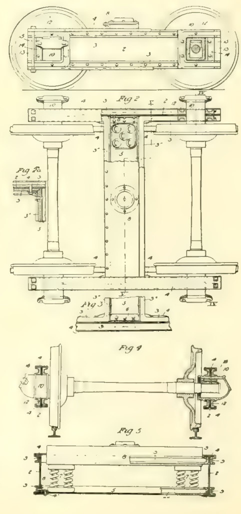
each other, a piston in the said cylinder and alternately opening and closing opposite ends of the port, and a carrier-valve moving with said piston and arranged to receive, carry and deliver a measured quantity of the fluid, the said carrier-valve having two valves, and a valve-stem formed with chambers for receiving and containing the fluid.

Car Truck

No. 664,312.

CYRUS M. CARNAHAN, of Allegheny, Pa.

In a car truck the combination of plate side members provided at each end with reinforced journal box housings open at the outer ends, upper and lower reinforcing channel members at each side of the plate, upper and lower reinforcing channel members projecting beyond the ends of the side members, removable reinforced end sections with means for holding them in position between the upper and lower channel members, a middle cross member rigidly connecting the side members, supplemental upper cross members formed of continuations of the inner side reinforcing members and constituting bolster-guides, and a bolster mounted between the upper cross members and supported by the middle cross member.



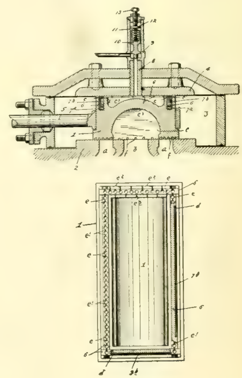
Engine Valve

No. 656,888.

WINFIELD S. HAINES, of Gladstone, Mich.

In a balanced slide-valve, the combination with the valve and the balancing plate, of packing strips having pits or cups in their faces open to steam pressure, whereby the strips are lubricated and are partly balanced.

In a balanced slide-valve, the combination with the valve and the balancing plate of the packing strips carried by the valve and the springs for preventing the strips from falling away from the surfaces which they are intended to pack when the steam is turned off, whereby the said packing strips will always be forced into proper packing position when the steam is turned on.

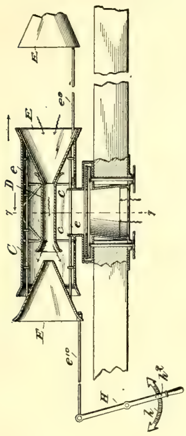


Car Ventilation

No. 664,113.

WILLIAM E. ANDREW, of Atlantic Highlands, N. J.

A ventilating apparatus comprising a vacuum chamber, a suction or induced draft flue, the discharge mouth of the vacuum chamber extending beyond the inner wall of the induced draft flue, to



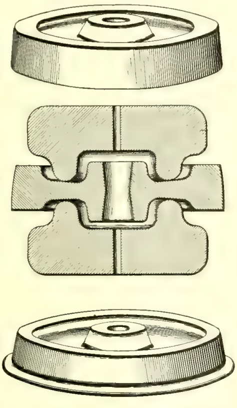
form a ledge to prevent entrance of water to and within the vacuum chamber and the inner wall of the induced draft flue diverging from the discharge mouth of the vacuum chamber, thereby to shed any water that might enter the induced draft flue, a forced draft flue contained within the induced draft flue and bridging the discharge mouth of the vacuum chamber, the ends of the forced draft flue being flared, and movable funnels for directing a current of air through the forced draft flue and to prevent passage of external air through the induced draft flue.

Method of Manufacturing Car Wheels

No. 663,317.

FRANK A. WHEELER, of Pittsburg, Pa.

The herein described method for manufacturing car wheels which consists in first forging from a suitable ingot a car



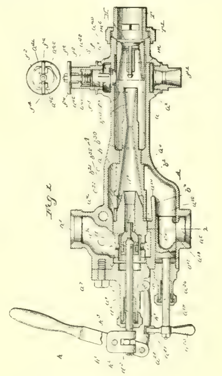
wheel bloom or blank formed with an integral hub, web and rim portions, said web and rim portions increasing in thickness from said hub portion, second muffling the hub and thinner portion of the web and suitably reheating the thicker portion of said web and the entire rim portion, and third simultaneously rolling said web to an equal thickness throughout, said rim to a desired thickness and the periphery of said rim into a tread and flange.

Injector

Reissue 11,877.

NATHANIEL B. DODGE, of Fitchburg, Mass.

In an injector, a casing having an opening at the steam end and provided with a threaded seat for and to fixedly position the steam cone and a non-threaded seat for the combining cone, the cones being adapted to be inserted through the said opening of the casing, means to detachably connect the cones, and a detachable closure for the steam end of the casing.



Notes of the Railroad Supply Trade

The National Railway Specialty Company and the Western Railway Equipment Company have jointly issued the following notice: "By virtue of agreements, as well as licenses granted between the two companies whose names hereto appear, and in recognition of the validity of the patents of both companies, notice is hereby given that on and after Dec. 1, 1900, all door fixtures heretofore sold by either the National Railway Specialty Company of Chicago or the Western Railway Equipment Company of St. Louis will be sold by both companies, and any orders given to either company for door fixtures handled by said companies will receive prompt attention."

The McCord journal box has been specified on the 1,500 cars for the Chicago & Eastern Illinois which are being built by the American Car and Foundry Company and the Mount Vernon Car Company.

The Chicago, Burlington & Quincy Railway has been experimenting recently with acetylene gas for train lighting. A chair car is now in service which is lighted by this method, the gas being generated in a plant which is individual to the car.

Plans are said to be under consideration by the Baltimore & Ohio for extensive improvements at the Mount Clare shops. It is expected that if this work is carried out these shops will form one of the most modern plants in the country. An entirely new machine shop is proposed, and it is to be equipped with the latest tools and labor-saving devices. In the work under consideration it is estimated that about $200,000 will be spent.

The Westinghouse Air-Brake Company recently closed a contract with the Pennsylvania Railroad to furnish 5,400 sets of the new Westinghouse friction draft gear. The contract is worth, approximately, $200,000. Some time ago the Westinghouse secured from the Baltimore & Ohio a contract for 7,000 sets of the gear.

The Pittsburg Coal Company is building a new car repair shop at Montour Junction, Pa., which will be used for the repair of its individual coal cars and for the Montour Railroad, which is owned by this company. The contract for the building was awarded some time ago to H. J. Bishop, of Pittsburg, and the structure is now up to the foundations. Manning, Maxwell & Moore will furnish the lathes, drills and other similar equipment, and the nine motors and generators will be furnished by the General Electric Company. The engines will be built by the Harrisburg Foundry and Machine Company, and the boilers will be installed by the Erie Iron Works. The heating apparatus will be arranged by the U. Baird Machinery Company.

It is reported that the American Sheet Steel Company will build eight additional mills at the Midland Steel plant in Muncie, Ind., the improvements to cost about $200,000.

The Gould system of electric lighting by power derived from the car axle is being applied to the business car of General Manager Ramsey, of the Wabash.

The Simplex Railway Appliance Company, Chicago, will furnish body and truck bolsters for 800 cars for the New York, Chicago & St. Louis, 575 cars for the New York, Ontario & Western, and 100 cars for the Cincinnati, Hamilton & Dayton.

Book Reviews

A CATECHISM ON THE COMBUSTION OF COAL AND THE PREVENTION OF SMOKE.

A Practical Treatise for Engineers, Firemen, and all others interested in Fuel Economy and the Suppression of Smoke from Stationary Steam Boiler Furnaces, and from Locomotives. By William M. Barr, M. E. One Volume, nearly 350 pages, 85 engravings. New York: Norman W. Henley & Company, 132 Nassau street. 1900. Price, $1.50.

Mr. Barr has adopted the catechism style in this book, as being the best form in which to present information to practical and busy men.

The first chapter is devoted to a consideration of fuel, and in it he gives valuable information under appropriate divisions, such as the composition of fuels and the commercial classification of fuels. The explanation of what culm is and the composition of semi-anthracite and semi-bituminous coals leads up to a consideration of the proximate composition of bituminous coal with an extensive table giving an analysis of the various kinds found in different parts of the United States, the amount of water, gas and carbon in each, the amount of ash, the heat units per pound, and the theoretical evaporation per pound of fuel from and at 212 degrees F. Coke, block coal, cannel coal, brown coal, lignite, are all dealt with in one or more paragraphs, which bring out important facts. Wood and peat are also discussed, and the chapter closes with some information relative to patent fuel.

In Chapter II. some elementary data are given, the knowledge of which is requisite to a clear understanding of the whole subject.

Chapter III. deals with the atmosphere, its properties, composition, weight, height and pressure and the quantity required in burning different kinds of fuel.

The next two chapters cover combustion and the products of combustion and contain much valuable information. A useful fact is brought out that much may be learned from the inspection of the ash left after any coal has been burned if one knows what to look for or understands the significance of what he sees. The part played by sulphur in coal and its action on the surfaces of boilers is touched on. The explanation of Prof. Ringlemann's smoke scale is most interesting. The scale contains five shades—white, transparent vapor, light brown smoke, brownish gray smoke, dense smoke and thick black smoke. The first of these is called white, the other four are represented by oblong areas crossed by vertical and horizontal lines. The various shades in the scale are reproduced by increasing the width of the lines, and consequently decreasing the white areas between, as one passes from the lighter to the heavier kinds of smoke. These representations simulate the real shade very closely when held at a distance of from 80 to 100 ft. from the observer. This scale is in use in portions of England, France and the United States.

Under heat developed by combustion a chart is given which shows where the coal goes when burned in the fire-box of a locomotive. The diagram was prepared by Mr. E. H. McHenry, chief engineer of the Northern Pacific Railway, and shows the heat losses of one pound of Red Lodge coal burned in ordinary service in a Mogul engine fire-box. The chart may prove a revelation to many who have a very good acquaintance with the subject.

Fuel analysis indicates by its name the character of the ground covered.

Chapter VIII. is concerned with the heating power of fuel, and gives in detail the construction of a number of calorimeters. Among other things the fact is brought out that in wood, carbon is the only constituent available for combustion, the hydrogen present in wood uniting with oxygen to form water. The comparative value of wood and coal as fuels is also stated.

The next two chapters, "Stationary furnace details and locomotive furnace details," give information on the various mechanical stokers and other appliances used by these two classes of steam generators. "Chimneys and Mechanical Draft" deals with natural and forced drafts induced by air or steam as applied to stationary plants.

The concluding chapter is devoted to spontaneous combustion, explains its origin and gives practical hints on the storage of large quantities of coal.

Altogether, the book is a mine of valuable information on all matters connected with the combustion of coal.

AIR-BRAKE CATECHISM.

A complete study of the air-brake equipment, including the latest devices and inventions used. All troubles and peculiarities of the air-brake and a practical way to find them and remedy them are explained. By Robert H. Blackall, Air-brake Instructor and Inspector with Westinghouse Air-Brake Company. Fully Illustrated. Twelfth Edition, Revised, Enlarged and brought right up to date. Price, $1.50. New York: Norman W. Henley & Co. 1900.

The twelfth edition of the Air-Brake Catechism, by Mr. Blackall, has come from the press revised and enlarged. The book contains what may be called five new chapters in which the questions and answers deal respectively with increased brake efficiency for heavy freight trains, air-brake recorder gauges, Sansom bell ringer, Oehse bell ringer and sanders. Thirteen new illustrations have been added, and the whole book has been revised and brought up to date. The work goes fully into the air-brake question, and the new matter contained will render the twelfth edition a very useful book for the student and all others interested in the subject of which it treats.

At a meeting of the Executive Committee of the Safety Car Heating and Lighting Company, Dec. 18, David A. Pye, formerly purchasing agent, was made assistant to the vice-president of the company.

The entire plant of the Brown Hoisting Machinery Company, Inc., of Cleveland, excepting the office building and pattern shop, was destroyed by fire early on the morning of Dec. 17. The fire started in the shop of the Elwell-Parker Electric Company, which occupied a part of the works of the Brown Hoisting Machinery Company. The severest loss is in the form of work just finished or in the process of building. New works will be built at once, and it is expected that they will be running within 60 days. In the meantime the contracts on hand will be turned over to other concerns for filling.

The Burlington & Missouri River is putting electric headlights on a number of locomotives.

The Rio Grande Western order placed with the Pressed Steel Car Company calls for 100 steel flat cars of 100,000 lbs. capacity; 100 box cars, 41 ft. long, of 80,000 lbs. capacity, and 100 flat-bottom gondola cars of 90,000 lbs. capacity. These are for January, February and March delivery, respectively. The order placed with the American Car and Foundry Company for 100 box cars is for January delivery. These cars will be 36 ft. 6 in. long, and will be equipped with American cast-steel body and truck bolsters. These last cars will have steel channel center sills, cast steel draft lugs and tandem spring draft rigging.

The Southern Car and Foundry Company have about 175 men at work at Gadsden, Ala., between 500 and 600 at Anniston and 250 to 300 at Lenoir, Tenn. The plant at Memphis is not in operation. Car builders and others in the South find it increasingly difficult to get long pine timber suitable for sills and similar construction, and the conviction is growing in that part of the country, as well as elsewhere, that metal framing must come more and more into use. Sill timbers are brought from as far as Southern Georgia for the Anniston shops.

A. A. Hickerson, who sued the Baltimore & Ohio in the United States Circuit Court at Toledo for damages for having been discharged and blacklisted, has been awarded by the jury the sum of $400; but, according to the newspaper reports, the damages are assessed by the jury because a statute of Ohio requires a railroad to give to a dismissed employee the reasons for his dismissal, and not because there was any evidence of blacklisting.

PERSONALITIES.

Mr. W. A. George, general foreman of the shops of the Colorado Midland at Colorado Springs, Colo., has been appointed master mechanic of the Colorado & Southern at Denver, Colo.

Mr. F. J. Zerbee, master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis at Wabash, Ind., has been transferred to Bellefontaine, Ohio, and is succeeded at Wabash by Mr. W. P. Orland, heretofore master mechanic at Mattoon, Ill.

Mr. J. S. Turner, formerly superintendent of motive power of the Fitchburg, has been appointed superintendent of motive power of the Toledo, St. Louis & Western.

Mr. Wilson Butler has resigned his position in the sales department of the American Car & Foundry Company to become second vice-president of the Simplex Railway Appliance Company.

It is officially announced that on and after Dec. 10, 1900, the office of motive power clerk of the Great Northern was abolished. All reports heretofore made to Mr. J. C. Morrison, motive power clerk, will hereafter, until further orders, be made to Mr. Max Toltz, mechanical engineer, St. Paul, Minn.

Mr. N. Kirby, master mechanic of the Mobile & Ohio at Tuscaloosa, Ala., has been appointed master mechanic at Whistler, Ala., in place of Mr. D. O. Smith, resigned. Mr. T. E. Harwell, general foreman at Okolona, Miss., succeeds Mr. Kirby at Tuscaloosa.

Mr. John E. Tessyman, for many years in the draughting department of the Barney & Smith Car Company, Dayton, Ohio, has connected himself with the Sterlingworth Railway Supply Company, of Easton, Pa., as chief draughtsman.

The firm of Albert Waycott & Co., of St. Louis, has been incorporated under the title of the Waycott-Andrews Supply Company. Mr. Albert Waycott is president; Mr. J. S. Andrews, vice-president and general manager; Mr. Thomas Dunn, treasurer, and Mr. F. C. Stevens, secretary.

Mr. A. E. Reed, superintendent of the Altoona Division of the Pennsylvania Railroad, died at Philadelphia, Pa., on Oct. 26, at the age of 45 years. He was born at Brooklyn, N. Y., on Oct. 15, 1855, and had been in the service of the Pennsylvania Railroad since 1875. He was superintendent of the Lewiston Division from Jan. 1, 1893, to Dec. 10, 1896, and had been superintendent of the Altoona Division since the latter date.

Mr. Walter J. Thomas has been appointed master mechanic of the Chesapeake & Ohio at Louisville, Ky.

Mr. E. P. Needham has been appointed assistant master mechanic of the Wabash at Decatur, Ill., in place of Mr. F. H. Paine, resigned.

Mr. E. E. Hudson has resigned as master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis at Bellefontaine, Ohio, to take charge of the shops of the Lake Shore & Michigan Southern at Cleveland, Ohio.

Mr. I. A. Sweigard, late general superintendent of the Philadelphia & Reading, has acquired an interest in the Johnston Railroad Frog and Switch Company of Chester, Pa., and has been elected vice-president of the company.

Mr. John F. Miller, general superintendent of the Pennsylvania Lines West of Pittsburg, will retire from that position on Jan. 1 under the provisions of the new pension plan. Mr. Miller is now 70 years of age, having been born at Ithaca, N. Y., on July 16, 1830, and has been in the service of the Pennsylvania Lines since 1852, when he began as freight brakeman. He subsequently served as freight conductor, passenger conductor, train dispatcher, train master and division superintendent until he was appointed general superintendent in 1885.

Mr. P. M. Elliott has been appointed to succeed Mr. J. S. Andrews as Western representative of the Monarch Brakebeam Company, with office in the Old Colony Building, Chicago.

Mr. D. J Durell, who for two years has been connected with the Universal Car Bearing Company, Old Colony Building, Chicago, has resigned to accept the position of mechanical engineer of the Pennsylvania Company at Columbus, Ohio.

It is reported that Charles E. Doyle, general superintendent of the Chesapeake & Ohio, will be promoted to general manager on Jan. 1. It is also stated that the jurisdiction of General Superintendent J. M. Gill, of the Western Division, is to be extended over the entire system.

Mr. R. A. Dugan, heretofore purchasing agent, has been promoted to assistant general manager of the Elgin, Joliet & Eastern and Chicago, Lake Shore & Eastern roads, with office at Joliet, Ill.

Mr. Walter J. Thomas has been appointed master mechanic of the Chesapeake & Ohio, with headquarters at Louisville, Ky.

J. B. Martin, supervisor of bridges and buildings of the Knoxville Division of the Louisville & Nashville, died at his home in Lebanon, Ky., on Dec. 12.

Mr. Judson C. Clements, of Georgia, has been re-appointed a member of the Interstate Commerce Commission by President McKinley.

Mr. S. K. Dickerson, master mechanic of the Lake Shore & Michigan Southern at Cleveland, Ohio, has resigned, it is said, to accept a similar position with the Atchison, Topeka & Santa Fe on Jan. 1.

Mr. A. S. Blodgett has been appointed superintendent of bridges and buildings of the Kansas City, Fort Scott & Memphis and associate roads, with headquarters at Kansas City, Mo., and the position of road and bridge master of the Kansas City, Memphis & Birmingham, heretofore held by him, has been abolished.

Mr. William Swanston, master mechanic of the Pittsburg, Cincinnati, Chicago & St. Louis at Indianapolis, Ind., will retire Jan. 1 under the provisions of the pension plan. He is 73 years of age, and has been in continuous railway service since 1850.

Mr. William M. Corbett has resigned as superintendent of the Evansville & Terre Haute, to accept the position of superintendent of the middle division of the Chicago & Alton, with headquarters at Springfield, Ill. He has been superintendent of the Evansville & Terre Haute since 1890, and was formerly trainmaster of the Delaware Division of the Erie.

Mr. Benjamin R. Croker, at one time purchasing agent of the Central Pacific, died in Sacramento on Dec. 13.

Mr. O. Tracy, supervisor on the Baltimore & Ohio, with headquarters at Zanesville, Ohio, has resigned. He had been in the service of the company 51 years.

John Bott, heretofore master mechanic of the mills of the American Steel Hoop Company, at Youngstown, Ohio, has been appointed chief engineer at the Brown-Bonnell plant of the Republic Iron and Steel Company, in Youngstown.

Mr. J. M. Maris, well and widely known in railroad and supply circles, has become a partner in the firm of A. M. Crane & Co., of Chicago, and treasurer of the Scientific Manufacturing Company, manufacturers of commercial decalcomanias, of which company Mr. Crane is president. Messrs. Crane and Maris are strong men in their departments, and success should be theirs. A. M. Crane & Co. represent the following concerns, who, by the way, are to be congratulated upon their new representatives: Morgan Spring Company, Worcester, Mass, springs and wire; Norton Iron Works, Ashland, Ky., steel nails; American Steel Castings Company, Thurlow, Pa., car couplers and bolsters; Westmoreland Steel and Manufacturing Company, Pittsburg, Pa., steel bars, angles, channels and forgings.

Mr. James Buchanan has resigned as division superintendent of motive power of the New York Central at West Albany.

Mr. F. W. Chaffee, formerly master car builder of the New York Central at West Albany, has been appointed chief inspector, and is succeeded by Mr. A. L. Kendall, who will have the title of general car foreman.

New Equipment

Cars Ordered During the Month of December, 1900

Ordered By.	No.	Class.	To be built by.
Armour & Co.	70	Refrigerator.	Am. Car & Fdry. Co.
Atlantic Coast Line	300	Box.	So. Car & Fdry. Co.
A., T. & S. F.	300	Coal.	Ill. Car & Eqt. Co.
" " " "	500	Refrigerator.	Am. Car & Fdry. Co.
Boston Elev. R. R.	45	Passenger.	St. Louis Car Co.
" " "	30	Passenger.	Wason Mfg. Co.
" " "	22	Passenger.	Osgood, Bradley & Sons.
Buffalo & Susq.	200	Gondola.	Barney & Smith Car Co.
Canada Atlantic	25	Flat.	Own shops.
" "	60	Coal.	" "
Canadian Pacific Ry.	10	Passenger.	" "
" " "	100	Flat.	" "
C., C., C. & St. L.	1,500	Box.	The Pullman Co.
" " " " "	500	Box.	Am. Car & Fdry. Co.
" " " " "	700	Coal.	" " " "
Central of Georgia	200	Box.	Own shops.
Choc., Okl. & Gulf	350	Box.	So. Car & Fdry. Co.
" " "	400	Box.	Mt. Vernon Car Co.
" " "	100	Box.	Georgia Car Mfg. Co.
Chi., Indps. & L'ville	4	Passenger.	Am. Car & Fdry. Co.
" " "	200	Flat.	Haskell & Barker Car Co.
" " "	50	Stock.	" " " "
Cleveland Ref. Co.	4	Tank.	Erie Car Works.
Cleve., Lor. & Wheel'g.	500	Coal.	The Pullman Co.
" " "	200	Box.	" " "
Chi., Mil. & St. Paul	200	Coal.	Own shops.
" " " "	200	Ore.	" "
C., N. O. & T. P.	600	Coal.	Pressed Steel Car Co.
C. & N. W.	3,000	Box.	Haskell & Barker Car Co.
Cont'l Fruit Exp.	20	Refrigerator.	Am. Car & Fdry. Co.
Craig Oil Co. (Toledo)	12	Tank.	Erie Car Works.
C., R. I. & P.	100	Furniture.	Ill. Car & Eqt. Co.
Derr Con. Co.	63	Ballast.	Rodger Ballast Car Co.
D. & H.	500	Coal.	Am. Car & Fdry. Co.
" "	100	Mining.	" " " "
Dav., R. I. & N. W.	75	Flat.	Pressed Steel Car Co.
Fairfield & N. E.	5	Flat.	Am. Car & Fdry. Co.
Ga. So. & Fla.	4	Passenger.	Barney & Smith Car Co.
Goodwin Car Co.	40	Dump.	Am. Steel Fdry. Co.
Grand Trunk	500	Box.	Am. Car & Fdry. Co.
Great Northern	4,000	Box.	Haskell & Barker Car Co.
" "	2,000	Box.	" " " "
Hocking Valley	1,500	Coal.	The Pullman Co.
Illinois Central	300	Furniture.	Own shops.
Iowa Central	50	Ballast.	Rodger Ballast Car Co.
Lehigh Valley	50	Mining.	Am. Car & Fdry. Co.
Los Ang. Terminal	5	Passenger.	" " " "
L. S. & M. S.	1,000	Coal.	Haskell & Barker Car Co.
" " " "	200	Furniture.	" " " "
" " " "	300	Passenger.	The Pullman Co.
Maine Central	250	Box.	Laconia Car Co.
Michigan Central	10	Passenger.	Own shops.
Missouri Pacific	2,500	Box.	Am. Car & Fdry. Co.
" "	500	Flat.	" " " "
Mex. International	100	Box.	Mt. Vernon Car Co.
Nelson Morris & Co.	100	Refrigerator.	Ill. Car & Eqt. Co.
Northw. El. Chi.	30	Passenger.	Am. Car & Fdry. Co.
Northern Pacific	48	Passenger.	The Pullman Co.
" "	1,000	Coal.	Pressed Steel Car Co.
N. O. & N. E.	200	Box.	Am. Car & Fdry. Co.
N. Y. Central	500	Box.	" " " "
" " "	25	Passenger.	The Pullman Co.
N. Y., O. & W.	25	Gondola.	Pressed Steel Car Co.
" " " "	25	Gondola.	Sterlingw'h Ry. S'ply Co.
N. Y., N. H. & H.	27	Passenger.	The Pullman Co.
" " " " "	20	Passenger.	Osgood, Bradley & Sons.
Ohio Southern	100	Gondola.	Pressed Steel Car Co.
Ohio River	14	Passenger.	Am. Car & Fdry. Co.
" "	250	Gondola.	" " " "
Pennsylvania	1,000	Flat.	Pressed Steel Car Co.
Phil. & Reading	1,000	Gondola.	" " " "
" "	500	Gondola.	Cambria Steel Co.
" "	500	Box.	Am. Car & Fdry. Co.
" "	20	Passenger.	Harlan & Hollingsw'h Co.
" "	10	Passenger.	Jackson & Sharp Co.
Pitts. & Buf. Coal Co.	110	Gondola.	Ill. Car & Eqt. Co.
Pitts., Shaw. & No.	500	Coal.	Am. Car & Fdry. Co.
Rio Grande Western	50	Stock.	" " " "
Rogers Ballast Car Co.	20	Ballast.	" " " "
San An. & A. Pass.	200	Box.	" " " "
Sav., Fla. & Western	50	Box.	So. Car & Fdry. Co.
Somerset R. R.	100	Box.	Am. Car & Fdry. Co.
Southern Indiana	500	Box.	Barney & Smith.
Southern Pacific	200	Stock.	Am. Car & Fdry. Co.
St. Charles Ref. Desp.	50	Refrigerator.	" " " "
St. L. & San Francisco	10	Passenger.	" " " "
" " " "	5	Baggage.	" " " "
" " " "	3	Furniture.	" " " "
St. Louis S. W.	500	Box.	" " " "
Swift & Co.	200	Refrigerator.	" " " "
Tennessee Central	350	Coal.	" " " "
Un. Coal Tar Ch. Co.	8	Tank.	Ill. Car & Eqt. Co.
Union Pacific	480	Ballast.	Pressed Steel Car Co.
" "	300	Coal.	" " " "

Subsequent numbers will contain a record of locomotives, as well as cars, ordered during the preceding month.

Mr. Oscar Antz, general foreman, locomotive department, of the Lake Shore & Michigan Southern Railway, at Elkhart, Ind., was married on Dec. 26 last, at Newark, N. J., to Miss Jennie Lavinia, daughter of Mr. J. H. Menagh.

Messrs. M. R. Muckle, Jr. & Co., the Philadelphia representatives of Messrs. Westinghouse, Church, Kerr & Co., have removed to their new offices, No. 512 Stephen Girard Building, No. 21 South 12th street, Philadelphia, Pa.

Mr. George L. Potter, formerly general superintendent of motive power at the Pennsylvania Lines West of Pittsburg, has been appointed general manager of the system to succeed Mr. L. F. Loree, who has been elected fourth vice-president. Mr. Potter, who was born in 1856, entered the service of the Philadelphia & Erie in 1876; he became assistant master mechanic at Fort Wayne in 1882, and master mechanic in 1887. In 1893 he was promoted to be superintendent of motive power of the Northwest System; and, in 1899, was appointed general superintendent of motive power of the Pennsylvania System West of Pittsburg.

George C. Murray, who has heretofore had the title of Western sales agent for the Sterlingworth Railway Supply Company, has been appointed Western manager of that company dating from Jan. 1, 1901.

Roger W. Conant, who was connected with the Boston Elevated Railway for nine years as electrical engineer, has resigned to accept a position with the Gold Car Heating Company as manager of their New York office. Mr. Conant is well and favorably known to railway officials both here and abroad through his writings on electrical and mechanical engineering. He is a graduate of the Massachusetts Institute of Technology, and has been engaged in practical railway engineering for many years. His resignation from the Boston Elevated Railway was received with regret, the management expressing their appreciation of his work and sincerely wishing him success in his new undertaking.

Mr. Charles F. Brookes, railroad editor of the Buffalo Commercial, whose work has commanded a great deal of respect, has gone to the Assembly at Albany. Mr. Brookes overcame a nominal Democratic plurality, in his district, of 1,500, and was elected on a plurality of between 300 and 400 votes—a good tribute to a good man.

Mr. J. A. Miller, who recently resigned as purchasing agent of the Ann Arbor, has become general manager of the Toledo Ice and Coal Company, at Toledo, Ohio.

Mr. Henry Crane, after 50 years' continuous honorable and successful service with the Chicago & Northwestern, having expressed his desire for retirement from active service, effective Jan. 1, 1901, the position of superintendent of bridges and buildings, Wisconsin Division, with headquarters at Janesville, Wis., will be discontinued. Arthur Montzheimer, with headquarters at Milwaukee, takes charge of the bridge and building department for the entire division from that date.

A consolidation has been effected of the Q & C Company and the Railroad Supply Company, under the title of the latter, with D. S. Wegg as chairman of the board, and C. F. Quincy as president. The general offices of the Railroad Supply Company will be in the Bedford Building, Chicago, and the Eastern offices, at 106 Liberty street, New York.

Just as we go to press the daily papers invite the public to believe that Mr. Carnegie is about to invest $12,000,000 in a pipe and tube plant at Conneaut, Ohio.

It may be true, but no one need be surprised if it prove to be the same kind of "pipe" business that Mr. Carnegie indulged in about two years ago, when an equally careful announcement was made that the Carnegie Company was about to adopt the steel car business as its own.

Shortly afterward, Mr. Carnegie changed his mind, and the world learned that the Pressed Steel Car Company had contracted with him for practically all of its steel plate for ten years.

The co-incidence was not necessarily significant, of course; but there may be an Ethiopian in the wood-pile this time.

RAILROAD DIGEST

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EDWARD A. PHILLIPS ALBERT G. GLOVER
GEORGE S. HODGINS, Editors

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The Reception of the Digest

The confident anticipations with which the Railroad Digest was launched have been amply justified by the reception accorded it by the "busy railroad man," for whose convenience and edification it was designed on the lines of the preceding and present numbers—features which will hereafter be permanently characteristic of the publication. There is no longer any question as to the need having existed for a periodical which would convey, for a minimum expenditure of time and trouble, a comprehensive idea of what is being published in the many railroad and engineering periodicals of the world. This, the progressive railroad official has long felt the need of; and abundant evidence that he appreciates the service rendered him by the Digest, is forthcoming in the rapid and steady flow of subscriptions from railroad officials of all departments and from all parts of the country, secured by no more strenuous effort than the mailing of sample copies of the January number. These subscriptions are of course the substantial recognition we desired and had bid for; but they are invested with a peculiarly gratifying charm when accompanied, as so many of them are, by letters speaking in highly commendatory terms of the way in which the Digest idea has been materialized.

It would require a great deal of space to print even a tithe of these letters; and testimonials (except they have a personal concern) are tiresome reading; yet, as indicating the character and tone of them as a whole it is presumed to print the following few brief extracts:

"I wish to congratulate you upon the very attractive manner in which this journal is presented—both the general appearance and the name are calculated to at once win friends for your paper. The contents are also of unusual interest, and the 'digest' feature is one that at once appeals to railroad men in every line of service."

"Allow me to congratulate you upon the achievement of the dream of readers of railroad literature, in producing the Railroad Digest."

"I am convinced that it will prove to be very useful to railway people."

"It is just the thing for the busy railroad man."

The Committee on Subjects of the Master Mechanics' Association, to report at the next convention of the association, announces that it will be pleased to have members suggest suitable subjects for committee work for next year, and also subjects for topical discussion at the convention of 1901. Members having suggestions to make will please communicate promptly with the chairman of the committee, W. H. Marshall, superintendent motive power, L. S. & M. S. Ry., Cleveland, Ohio.

Electrical Transmission of Power in Machine Shops

Considerable attention has been given during the past few years to the subject of electrical transmission of power in large manufacturing establishments in different parts of the country. It is, however, only at a comparatively recent date that the application of such means of power distribution has come into anything like general use.

The end sought by the change from driving by steam engine, belting, shafting and counter-shafting to electrically driven machines is, in a word, economy, and unless the changes and alterations necessary to this will efficiently spell this word upon the pages of the ledger in the accountant's office in any large producing concern, the chances are that it will not grow in favor. Electricity having come later in the field and after the original method had become standard practice, a positive advantage must be guaranteed by its use. The advocate of electricity in this particular field is somewhat in the position of the drug clerk who was reluctantly compelled to let a prospective customer go away unsatisfied, and on being questioned by his irate superior as to why he had been so grossly recreant to his traditions as a vendor of remedies as not to have sold the man, (if he was short of what was asked for,) "something just as good," explained that he had been asked for a postage stamp!

That the substitution of electricity for belt, pulley and shaft does offer something not only just as good, but very much better, may be taken for granted by the action of the Baldwin Locomotive Works people in the introduction of electricity into their large establishment, a full and complete account of which is given in another column.

If a shop is to be built the use of electricity as a power transmitter will enable the architect to dispense with the heavy and rigid supports which have to be introduced into the building for the purpose of carrying revolving shafting and pulleys. If the shop has already been built, the substitution of electrically driven machinery will permit the light which comes in through windows or skylights to reach the machines, and in so doing reduce the numbers of hours in which the artificial light has to be used. The original cost of shafting, hangers, brackets, pulleys and belting will in a new establishment be avoided and in a converted shop will be partly returned by the sale of the equipment no longer required. In both cases the maintenance charges for these disappear from the books. The space thus rendered clear above makes possible the introduction of overhead travelers and electrically operated cranes which carry with them the time-saving element in the rapid handling of raw material, work and finished product. It also converts aisles and open spaces around machines into working areas where material may be laid or where fitting up may be done.

Another advantage which electricity brings with it is that it is most economical of power—using power only when the machine is in actual dividend-earning operation. If at night, noon hour or on holidays it is desired to run only one or two machines to catch up to the standard of output, or to finish special work on a time order, no coal has to be shoveled by the fireman to generate steam to uselessly turn lines and lines of shafting and pulleys and miles of belting. A modification of the same form of money-saving is to be found in the facility with which intermittently used tools can be grouped and driven from the same motor. Grindstones, emery wheels, tool-grinders, etc., may thus be grouped with advantage.

The most approved practice appears to be to keep the power part of all electrical installations separate and distinct from that which supplies the light. The continued variation of load due to the starting up and stopping of machines would most injuriously affect the efficiency of the light circuit.

One very important point which, while it does not bear directly upon economy in its restricted sense, may be appropriately mentioned here, for the benefit of all those who are using electricity in any form. We have the authority of the Electrical Review (quoted elsewhere in the Digest) for the statement that a violent or even a serious shock of electricity does not necessarily kill. No effort should be spared to resuscitate a workman who has inadvertently got himself "in circuit," or has accidentally been shocked into insensibility. Many of the humane societies have issued pamphlets or posters in which they state that a man "struck by lightning" or stricken by electricity in any form should be treated exactly as if partially drowned, and that artificial respiration should be at once tried and persisted in, until the arrival of competent medical aid.

Commercial Supremacy

That the people of Great Britain have become fully seized of the fact that the commercial supremacy of that country is in danger, is evidenced by the utterances in public of her prominent statesmen. Not only do they know that the future gives promise of a very keen industrial contest between England, the United States and Germany, but what is more to the point they seem to understand the reason why this country has been advancing and why they themselves have not been advancing in the same ratio. Technical education is believed to be the key to the position, and in that branch of general instruction both America and Germany seem to have surpassed England. Lord Rosebery in a recent speech before the Wolverhampton Chamber of Commerce, said: "England, in order to withstand international competition, must thoroughly educate her youth, and I would suggest sending batches of young men abroad to learn the best our rivals know." To further show that our friends on the other side of the Atlantic are alive to their position, we quote from a recent report to the Ontario Department of Education:

"In 1895 the Scotch Education Department deputed Mr. J. Struthers, one of Her Majesty's Inspectors of Schools, to inquire into and report upon the Sloyd system of manual training, as practiced at Naas, near Gothenburg, in Sweden, where the system originated. His report, published by the Scotch Education Department, is a most interesting and valuable document. The Education Department of Ireland has also taken evidence on the subject."

The report of these experts concludes with the following remarks:

"There are indications that, in the immediate future, our own countrymen will have to encounter a competition far more acute than anything they have yet had to grapple with. In the coming struggle for trade our fine insular position, our splendid race of workers and our excellent raw material, will undoubtedly count for much; but the possession of these advantages alone will not suffice; and we shall have to adopt certain of the methods which prevail abroad, about which our manufacturers in the past have cared too little, but which mean much to our customers. We must not be content to live longer upon the traditions and reputation of the past; but we must set ourselves to work diligently to study the wishes and fancies of those we have to serve; and we must, moreover, be prepared to meet them, even in such small subtleties as weight, measure and packing. Above all, we must endeavor to improve and develop our higher industrial and secondary literary and technical education machinery to our peculiar conditions; we must see that it is maintained at least on a level with that of any other nation."

The "Sloyd system" referred to is thus explained. "Sloyd is an Anglicized Swedish word (slojd), signifying 'skill, or dexterity, of hand,' and sloeg, an adjective, meaning skilful, or dexterous, from which we get the English word 'sleight,' in 'sleight of hand.' In Sweden, the word may be applied to any system of instruction which aims at giving increasing dexterity of hand to children, as in the case of kindergarten schools."

"In England, the Sloyd Association was formed with a view to emphasize the necessity for manual training in schools, and to present for adoption in them of a simple and systematized plan of industrial, or manual, work, in the shape of useful articles called 'models,' in which 'rounded work and the square work of the carpenter are duly alternated, and each model introduces . . . some new tool or fresh exercise. The chief tools used are the saw, the plane, the chisel, with the knife—the latter as the original and initial tool?' "

To turn now to the facts of the case, as far as commercial supremacy is concerned, we find from the World Almanac that the exports of Great Britain during the year 1899 amounted to \$1,604,388,700, and those of the United States in 1900 to \$1,394,483,082. These figures show that Great Britain is ahead of us in exports by \$209,905,618. Further, to fairly view the case as it stands, and before we can use the more restricted expression "Industrial supremacy" honestly, as applied to ourselves, we must deduct the breadstuffs exported by the United States, which the same authority gives as \$226,204,366. When this deduction is made it leaves the balance in favor of Great Britain of \$476,109,984. These figures are favorable to this country, inasmuch as the year 1899 is the last one given for Great Britain, while 1900 is used for the United States, so that while last year's advance is credited to this country, British advance in the same time is not included in the British figures.

In the exportation of cereals England, of course, never was, and never will be, our rival. We are at present behind Great Britain, but it is the phenomenal advance made by this country in recent years that has raised the question of the possible transference of "supremacy" from the old to the new world. We have advanced marvelously, and as the authority quoted tells us, "To Europe our exports for the year 1900 crossed for the first time the billion-dollar line, yet our exports to that continent show an increase of but 10 per cent. in 1900 over 1899, and but 50 per cent. over 1890."

On the other hand, we have to remember that England is not the Empire, and we are well aware that the British nation is almost invariably beaten at the outset of any contest, but that its permanent defeat is not thereby necessarily assured. The recent invitation extended by Canadian journals to British capitalists to prepare for American competition by erecting manufacturing plants in the Dominion is significant. The report on education already quoted shows that something is being done by the Government of Great Britain in the matter of technical education with a view of holding the position she has so long occupied.

We also find from reliable statistics that the total expenditure of the Science and Art Department of government in the United Kingdom in 1898 amounted to £606,335, or, taking the pound sterling at a value of \$4.85, the amount would reach the sum of \$2,940,724.75. It is therefore not for want of government money applied to education, that "supremacy" stands the chance of being transferred to this country. We ourselves admit that it is not incompetency on the part of the British workman, for when he comes here he is not found to be either lacking in brains or the ability to use them. We in this country do not believe that it is owing to the pernicious influence of trade unionism, as some of our British cousins have told us it is.

In this connection the New York *Commercial Advertiser* says: "Fuller information in regard to the action of the British trade unions in restricting output apparently puts the blame for it as much upon employers as workmen. The interview with Sir Hiram Maxim, reported in the *Sun* of Jan. 30, emphasizes the comparative lack of sympathetic co-operation between master and men. If it be true, as asserted, that the employer's attempt to keep the workman's receipts within fixed limits is persisted in, the prospect for any improvement is hopeless from both sides. Testimony that the British workman who does as little as he can in Glasgow or Birmingham manifests an extraordinary increase of productive power as soon as he is placed in an American factory points to a difference which is social rather than economic."

While not debating the question whether or not any class distinction exists between master and man over there, one thing is certain, that the greater freedom to use his brains which is given to a workman in this country must have a powerful influence upon the amount of his output, the rapid and economical use of his time and the quality of his work.

Another reason for the advance of the United States is found in the standardizing of its products. In the steel industry alone members of the Association of Iron and Steel Manufacturers have agreed together so that all rolled sections made by each and all of them are absolutely exact counterparts of those made by any other firm. For instance, an I-beam weighing, say, 20 lbs. to the foot, will have exactly the same sizes of web and flanges, the same contour, and the same thickness of metal at all corresponding points, whether it be made by the Carnegie Company at Pittsburg or the Pencoyd Company at Philadelphia. This is true of channels, angles, tees or any and all commercial shapes of rolled steel made anywhere in the country. When an American firm has to compete for a bridge in any part of the world, it has, roughly speaking, only to know the required length, and with perhaps the exception of the channel span, has practically all the data in its office upon which an estimate of the cost of the steel work is to be made, added to which is the experience gained by having built hundreds of bridges, made of these standard steel sections, upon short notice, for the railways of this country. This enormous advantage possessed by our manufacturers, competing for foreign trade is the result of mutual agreement between firm and firm

in this country, but which it is possible for Great Britain at any time to duplicate. When to this is added the fact that by nature we possess the most wonderful resources, spread over the enormous area of more than 5½ millions of square miles, and when with more than double the population we measure ourselves and our almost virgin mineral wealth against a country less in size than the single State of New Mexico, a country whose resources have been taxed for years, the wonder is not that America is advancing so rapidly, but that Great Britain has not long ago been hopelessly beaten in the contest. The possible, and by no means improbable development of the vast British colonial empire, with resources equal to our own, is one of the hazards in the game, which this country may not, later on, be able to ignore.

The spread of education, technical and manual, in the United States has been, within the last decade, rapid and far-reaching, and we believe it has been, as a rule, more eagerly sought for by the workman himself here than by his confrere in the old world. The British Government has made generous provision for technical education in the United Kingdom, and the press of that country, technical and non-technical alike, has not failed to warn the people, and to state the present economic conditions clearly and plainly. While it is too early for us to claim to hold this commercial supremacy, and while we remember that a stern chase is proverbially a long one, yet it is certain that unless our friends on the other side of the Atlantic abate somewhat of their immemorial conservatism, and cease to complacently undervalue their rivals, America will soon have competed successfully for the first place in the commerce of the world.

British and American Patent Systems

An article from the pen of Mr. G. Croydon Marks in Cassier's Magazine for January is well worthy of perusal, as taking a comprehensive view of the subject. The writer explains that the number of patents issued in America is greater than the number issued in Great Britain, and the reason for this is thought to be the "strong belief as to the official proof of validity and consequent freedom from infringement, which a patent granted in America is supposed to possess as a result of the search, which is instituted by the United States Patent Office before any patent is actually allowed." It is this official search by the Patent Office in this country which constitutes one of the principal differences between the two systems.

Another point of difference is that under the British law a "provisional patent" is usually issued at first. A "provisional specification" is filed which sets forth distinctly, yet broadly, the nature and subject matter of the invention. The value of this "provisional" idea is that for nine months it secures the inventor and enables him to make public tests, open experiments, exhibitions of plans, or the displaying of results without fear of piracy or loss of advantage. In this way he can solicit technical or financial aid without fear. In large machines or combination devices where it is impossible to bind over to secrecy those who happen to be connected with its construction or tests, the provisional patent effectually secures the inventor in the possession of his rights.

As before stated, the British Patent Office does not make any search. It is held that it is not the duty of the Patent Office to appraise the degrees of novelty or patentability of any invention. The Patent Office examines the specification, and when satisfied that only one invention is sought to be patented, that the two specifications, one of which describes the invention, and the other the method of carrying it into effect, agree, and that the description is clear and intelligible. It then advertises a formal acceptance, and for two months the specification lies open for public inspection and opposition. Printed copies can be purchased by any one. The object of this procedure is to permit all those interested to make themselves familiar with it, and also to give those who oppose the issue of the patent a chance to be heard. The controller hears both sides, either personally or represented by counsel, in the event of there being opposition, and decides as to refusing the patent or allowing the specification to be amended by a general or specific reference to the specification which has been cited; but the question of actual infringement is not adjudicated upon. Appeal lies to the law officer of the Crown. As showing the watchfulness of the public interested, it is stated than since 1884 about 2,000 patents have been thus opposed. The appeals from the controller have only been 20 per cent. of that number, and the reversal of the controller's decisions have been as low as 2 per cent.

It is sometimes contended that as the British Patent Office will grant a patent for the same invention to as many applicants as may care to pay the fees and file proper specifications, that the taking of such moneys is in the nature of fraudulent receipts. The British Patent Office leaves it to the courts to decide as to the degree of novelty between two or more inventions. Notwithstanding all this, inventors of experience appear to prefer the British system, because, often, specifications which differ from each other, apparently very slightly, may really have between them all the difference between failure and success, and the judgment of the office man unacquainted with the full technicalities of the art, might prevent the issue of a patent which would succeed, because he imagined it to have been barred by one which was commercially a failure.

The writer says that "this question of refusal, on official search to recognize important developments is a fact and not a theory, can be verified by the constant inability of the German and American Patent Offices to appreciate inventions which have been granted in Great Britain, and which have there been successful, and never considered as infringements by those interested in the older patented methods to which the officers have attached undue importance, owing to their being necessarily unfamiliar with the technicalities of the industry in its practical workings."

The system in the United States is for the Patent Office to make search; no provisional specification is accepted, and the method of payment is different from that of the British, and the patent, when issued, stands for 17 years. The British patent is secured for four years on payment of £4, and is held thereafter for a further period of 10 years on payment of a yearly fee. The method of attack, if one may so say, differs in the two countries. In an action for infringement the British system requires the validity of the entire set of claims in the specification. In America only the particular claim which is alleged to be infringed is required to be valid. The caveat issued in this country is a kind of provisional protection, for securing the rudimentary invention, and is open only to citizens of the United States. There is little in common between the United States caveat and the British provisional specification. The caveat is kept secret in the Patent Office, and is useful in proving priority or in heading off other inventors while the invention is in the crude or undeveloped state. The caveat entitles the caveator to notice should another person file an application for the same invention within one year from the date of the caveat. The British provisional specification must be followed within nine months by a complete specification, and both are printed and form part of the patent. The caveat forms no part of the United States patent.

When the complete specification is deposited at the United States Patent Office it is referred to an examiner, who, by the aid of his assistants, investigates the records and searches all printed specifications and documents connected with the subject matter of the patent with a view of ascertaining the degree of novelty or patentability of the invention, generally, and the relevancy of the claims. The Patent Office, in its report after this search, gives the inventor references of specifications which are supposed to limit or anticipate his invention, and he is required to answer such objections as the Patent Office may raise. If necessary further report and reference will be given, and suitable means of appeal are provided for the inventor if he is dissatisfied with the decision of the examiner. The writer tells us that "it is assumed by those without experience that the invention thus guarded is practically a certified one, and free from attack from that which has been done before; but the records of the patent actions in America prove otherwise."

The government fee here for a patent good for 17 years is $35, or £7, as against £99, which is the total cost of the British patent for a period of 14 years. The initial cost in Great Britain is lower than with us, as £4 secures the patent for four years and, if unremunerative, it can be allowed to lapse after that time. In the United States a patent does not issue at all until $35.00 has been paid to the government.

COMPOUND VS. SIMPLE LOCOMOTIVES

By Roger Atkinson, Formerly Superintendent of Rolling Stock Canadian Pacific Railway.

There still appears to remain a number of engineers who are not only agnostics with regard to the advantages to be obtained by compounding locomotives, but who appear to have decided in their own minds, and are ready to demonstrate, that such advantages do not exist, as, for instance, in the article, by Mr. C. E. Wolff, in the Practical Engineer, London, of Nov. 30, 1900.*

The wetness of steam in a locomotive largely depends upon the amount of steam space in the boiler, and the manner in which the steam is collected. Some eight or ten years ago it was common to find locomotives with 19 or 20-in. cylinders which had only about 40 to 45 cu. ft. of steam space in the boiler when the water level was 6 in. above the inside fire-box crown, whereas later engines (designed and built by the writer for two or three years) have over 100 cu. ft. of steam space under the same conditions. In addition to this, the height of the throttle or point of exit of the steam, has considerable influence upon the amount of water lifted or entrained; and, while older designs on which the writer was engaged, had the throttle only 33 in. above the normal water line, the later designs had a height of 46 in.

As regards adaptability, all locomotives are most economical when hauling comparatively slow trains, without stops, and at their lowest economy when hauling fast, stopping, trains. But the compound locomotive is always more than able to hold its own, if it is mechanically well designed. It seems strange that at this late date it should be stated that the compound locomotive is "usually a poor starter, unless some special arrangements are made for use at starting," seeing that it has been common for twenty years to have some kind of emergency valve to admit boiler steam to the low-pressure cylinder when required. In fact, it appears to the writer that the mechanical construction of such a device, which comprises the intercepting and reducing valves, is the only point of difference of moment between the various types of two-cylinder compounds, or cross compounds, as they are sometimes called. If these devices are poorly designed for construction, maintenance, easy inspection and repairs, then the compound locomotive may be troublesome, but this is not the case with the best and latest types, as these parts require no more care (and often much less) than an axle box or crank pin. In the two-cylinder or cross compound there are no more actual working parts than in a simple engine, as the movements of the intercepting and reducing valves do not form a portion of each revolution, and, in fact, stand still while the economy is being effected, so that the design of these parts is a mechanical matter, and only enters into the fuel economy in a secondary manner.

The writer has had considerable experience with locomotives of both systems built off the same drawings, by the same men, and as nearly alike as good practice, with care, can ensure, except as to the differences entailed by the compound feature. The compound locomotive has always, "on the average," in my experience proved itself to be economical in both fuel and water. The engineers† and firemen who handled them, and who were averse to them at first, have steadily changed their opinions as they gained experience with them, until they have come to prefer them to the simple engine. It took considerable time to do this—about seven years—but there was no pressure brought to bear upon them, as it was considered advisable and judicious to allow the men time to become accustomed to them and to learn their peculiarities; and at the same time it allowed the shopmen time to learn, not only the parts and system, but also what to look for in case of trouble or failure, and where it was likely to show itself first. Thus clause (1) in the article referred to was positively confirmed, viz., that compound locomotives do, under similar circumstances and conditions, save both coal and water.

With reference to clauses 2 and 3. There does not seem to be any contention to the effect that the maximum pressure on the crank pin is less in compound engines than in the simple engine, but the maximum pressure that the engine can develop without slipping is continued for a greater portion of the revolution. It is known that it is better, when starting a train, to keep the lever in the corner, and to use a light throttle, than it is to notch up and use a wider throttle, which is a similar operation; but the difference arises when it becomes advisable with a simple engine to notch up in order to avoid back pressure, since the compound can go on a considerable time longer in full gear without finding the back pressure become detrimental. The writer has, personally, a number of times, had a locomotive put into compound after getting its train under way in simple, to about six miles per hour, and a distinct forward jerk could be felt and a gain in speed noticed immediately. Observations also have been made many times to note how long it took the train to reach the "mile board" with both freight and passenger trains, and the compound always came out much ahead. It is generally recognized that a sudden sharp blow from the steam is more liable to cause an engine to slip, and at the same time a less "mean effective pressure" is obtained, than if a lower initial pressure and later cut-off is used. The writer has yet to find that the compound locomotive is not as well adapted for any class of service, except switching, as a simple engine, and for most services is decidedly superior. Far from being unsuitable for a service requiring frequent stops, if it is well designed, it will always beat the simple engine on time, as it gets out of a station more quickly; and, owing to less back pressure, with less injury to itself. The train conductors have learned to get aboard early if a compound locomotive is hauling the train.

Compound consolidations have been designed and built by the writer which have made 60,000 to 65,000 miles before requiring general repairs, and it was not found that there was any appreciable difference in repairs from the simple engine, and while on the road they were not allowed any more oil, etc.

In conclusion, so far as the writer's experience goes, with four different systems of compounds, many of the troubles incurred with compounds are mechanical, and not due to the compound feature at all, but are due to defective design and construction; and it is only a question of time before all mechanical men will fully recognize this to be a fact. When the locomotive engineer asks for a compound in preference to a simple engine, and gives as his reason that he can do better and more economical work with less trouble, labor and loss of time on his own part as well as on that of his fireman, it would lead any one to think that the success of the compound locomotive is beyond discussion.

*A synopsis of the article referred to was published in the January number of the Digest, page 18.

† The writer refers to enginemen on the C. P. R.

ELECTRICAL TRANSMISSION OF POWER AT THE BALDWIN LOCOMOTIVE WORKS, PHILADELPHIA, PA.

The proprietors of the Baldwin Locomotive Works were among the first manufacturers to install a plant for the electrical transmission of power at their extensive works in Philadelphia. This plant has been increased from time to time in capacity and efficiency until it now has an aggregate of over 3,300 h.p., in motors varying from 3 to 40 h.p. each.

The progressive spirit of the owners of these works is nowhere better exemplified than in the manner in which they have reconstructed their very extensive plant during the past few years to take advantage of the most modern methods of handling material and utilizing to the utmost the earning capacity of tools within restricted areas. So admirably have the details of their equipment been worked out, that the limitations in handling the heaviest and most bulky of shop products, in areas available in the heart of a large city, are hardly noticed.

Their manufacturing methods to-day hinge largely upon changes made possible by the constant and rapid advance of electrical power, and no other agency could have been substituted wholly therefor except at incomparably greater expense of installation and maintenance.

WHEEL LATHE SHOP; BALDWIN LOCOMOTIVE WORKS.

Heavy machinery, such as traveling cranes, can be and are operated by other agencies than electricity, but their success and practicability hinges upon the provision of overhead space, isolated from obstructions of line shafting, belts and numerous other appliances used in the construction of the buildings and operation of the plant in general.

In the Baldwin Works many of the most striking examples of economy are to be found in the heavy tool shops, the wheel and frame shops, for example, where motor-driven machines have cleared the space for the huge traveling cranes to operate in.

Foremost in the minds of the officials of these works is the constant desire to make their plant second to none in efficiency of operation and maintenance, and so carefully has this been adhered to that, since 1890 (when electric power was first introduced) the increase in the output of their products has been more than doubled.

The first installation of electrical power was introduced by them during the winter of 1889 and 1890, in that part of the plant called the erection shop, for the purpose of moving the locomotives in parts or when assembled.

In this shop the flues are set, the boilers finally tested, under steam pressure, the valves adjusted, each engine tried under steam, and all parts carefully examined to insure proper adjustment and satisfactory operation. In this shop seventy-five locomotives can be erected at one time. The length of building is 336 ft., the width 153 ft., and the height in the clear to base of rafters, 42 ft. Four electric cranes traverse the entire length of the building, two having a capacity of 100 tons and two of 50 tons and equipped with two 40 h.p. United States motors. The height of the crane above track level is 28 feet; span, 74 ft. 8 in.; the bridge travel is 200 ft. per minute; the trolley operates at a speed of from 50 to 100 ft. per minute at the will of the operator; the main hoist has four speeds, 5, 10, 20 and 40 ft. per minute; and the auxiliary hoist is capable of handling 1,000 pounds at a speed of 100 ft. per minute.

As a practical demonstration of what this first crane accomplished it is to be noted that the saving of labor in doing the same work under the old method of block and tackle, with steam appliances, was 50 per cent.

The operating of this large crane gave such unlooked for satisfaction in the handling of heavy work that steps were at once taken to install, in the wheel shop, a traveling crane for the same purpose.

The power house for generating the current to operate these cranes is located in the southwestern end of the block, or southern end of cylinder shop, and is equipped with two generators of 100 h.p. capacity, each belted to engine.

WHEEL SHOP.

The original wheel shop was filled with line shafting, large pulleys and counter shafting, running through the center of the shop, from which numerous belts were run to the several jib cranes employed in moving the wheels from the lathes to the tracks and also arranging the wheels so as to be ready for loading the machines. This necessitated two aisle ways 8 ft. in width, running the full length, one on each side of the shop as entrances for taking in and removing the wheels.

On account of belting and shafting, heavy timbers were necessary in the roof construction, and these, together with the large pulleys employed, made the shop very dark.

When the electric traveling crane was installed all shafting was done away with, the aisles were turned into available space for manufacturing purposes, large skylights were placed in the roof so as to give more light; and, by the absence of belts, light was obtained from the windows in the sides of the building; but the most important advantage obtained by this transformation was the time and labor saved in handling the wheels.

Under the old method it required a total labor force of 36 men to handle the work connected with this shop. The men were divided into gangs of six each to load and unload a pair of driving wheels, on axle, and move them from one place to another; and from 35 to 40 minutes was occupied in so doing.

In 1894 the new wheel shop was built and equipped with two 10-ton and one 5-ton traveling cranes. As soon as this was completed and put in operation an increased capacity of 33% was obtained by occupying the aisles, which also permitted the introduction of several more large wheel lathes and reduced the labor force to three men—one man in the cage operating the crane, one at the hook and one as a helper.

With this small force any set of wheels and axles could be loaded and unloaded to any machine in the shop in five minutes, and the electric cranes made possible the placing of the wheels in any way most convenient at the time of handling as well as the convenience of tiering them two and three deep, while, under the old method it was absolutely necessary to have them in regular order.

Of the 250 h.p. used in this section, chiefly 7½ h.p. motors on all the wheel lathes, it requires 85 h.p. registered at generators to operate the motors.

The method of connecting the electric power to the overhead traveling crane is done by the application of belts to a counter shaft which is supported by a frame fastened to the machine. This method allows the use of a simple motor connection; and, in case of any trouble caused by the burning out of an armature or otherwise necessitating the removal of the motor, it can be readily done and a new one replaced in a space of 15 minutes.

It can be seen that, with this method, absolute and perfect alignment every time a change is made is not necessary, as would be the case were a gear system of transmission used; again in case the speed of a tool is changed it is cheaper to operate by means of a cone pulley than to go to the expense of new gears.

POWER HOUSE.

Before any extension of the electric power could be made a new power house had to be constructed, as the limit of the first had been reached.

In the erection of this new power plant every detail for the handling of coal, and for economically operating the electrical distribution of the power has been carefully considered. By referring to the cross section the general location of boilers and electrical units can be seen.

In this power house is located the main switch board controlling the main feeders to all parts of the plant and the wiring of the circuits are such that the other three local power units are working and feeding to this main station and vice-versa.

There are four generators of 250 h.p. each multipolars connected direct to Kodok Westinghouse engines, the units also being of Westinghouse make. One of these units, of 250 h.p. is held in reserve. The electro-motive force of the circuit is 250 volts.

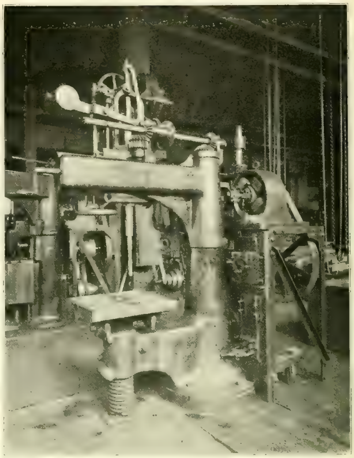
The handling of the coal is done by means of buckets, which run from top to bottom of the station. The boilers, made by Babcock & Wilcox Co., are equipped with automatic stokers. The coal is located in the basement, and the arrangement for removing the ashes provides for their being automatically fed to the ash wagon through the chute which runs from the ash pit under the boilers. The only place where the coal is handled by manual labor is in the basement, as the bins are fed by scoops attached to link belt transmission.

The electric feeder system from one power house to the other is all overhead, and of the following horse-power in capacity: From main power house to the first power plant of 200 h.p., marked as No. 4 circuit, 250 h.p.; No. 3 circuit; from M. P .H. to flange shop power house, 250 h.p.; No. 2 circuit from erecting shop to flange shop, 250, and from flange shop power house to 17th street power house, 100 h.p.

After the completion of the new power house rapid strides were made in equipping other shops, and the class of motors used were those of the Gibbs, Westinghouse and Crocker-Wheeler companies.

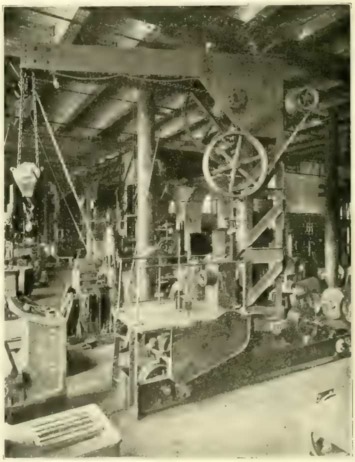
FRAME SHOP.

In this shop, which is six stories high, are a large number of motors of all sizes, and also many direct-connected machines of great interest. Motor capacity in shop, 100 h.p. on first floor.



RADIAL DRILL, MACHINE SHOP.

On the first floor are the huge slotting machines operated in every particular electrically, and the photograph of one of the four slotters which were made by the William Sellers & Co., Incorporated, is more than worthy of mention inasmuch as to have operated this class of machine by steam would have been so complicated as not to have been satisfactory. The speed of the motors varies from 750 to 1,500 r. p. m., the speed being changed by a field rheostat which controls the speed of the armature and gives two speeds to the motor. In addition to these two speeds there are two others operated by friction clutch which make four speeds by means of combination, and



TRAVELING SHOP CRANE.

TRAVELING CRANE OVER BUTTONWOOD ST.; BALDWIN LOCOMOTIVE WORKS.

take the place of a four-stop cone pulley. The control of this slotter is absolute, which is another feature to be credited to the electrical installation; for, if steam had been used in this case, many complicated and expensive appliances would have to be used. The slotter can be stopped at any desired point through the lever control; the starting of the motor is done in the regular way by the use of a starting rheostat.

The photograph of this machine shows the belt connection from motors to counter, which is located on the upper frame of the machine. This double-head slotter is run by a 20 h.p. motor, while the single slotters have 7.5 h.p. motors.

The 62-in. frame planers are also connected through counters shafting, as was the case when low speed line shafting was of 20 h.p. capacity.

On the second floor the machines for connecting rods are located and operated by and through six motors and line shafting. One line shaft on each side of the shop and each side operated by three motors.

The third floor contains lathes, shapers, yokes, valve rods, etc.; also operated motors belted to line shafting and divided into four sections, one motor for each section. This was the last floor to be connected electrically.

On the fourth and fifth floors the guide yoke and crosshead planers are located. The fourth, fifth and sixth floors are operated by steam.

On the sixth floor, south end, is located the electrical repair department; one man having charge of the motor winding which, for a plant of this size, is very small, and two others who look after general repairs.

All drill presses in this building and throughout the plant, where electrically operated, have 3.5 h.p. motors.

It has been proven that wherever a number of small machines are in constant use it is more economical to operate by use of counter shaft rather than by direct connection. The method is to group the machines in lots of 10 or 15 and drive by line shaft with one motor, and have a continuous line shaft through entire length, breaking at intervals according to load on any one section. If at any time machines are added or taken away it is a very small matter to break connection in shaft and throw 10 or 20 machines on to any motor desired.

All line shafting through the entire electrical transmission connections run at 200 r.p.m., which enables them to reduce directly from the motor without driving through intermediate shafing, as was the case when low speed line shafting was used, thus enabling them to make direct connection and doing away with an extra shaft. Another advantage in the electric transmission and the grouping of tools is the first cost of motors over what would be required if individual motors were used. Again, the motors of large capacity secure higher efficiency and cost very much less per horse-power for care and repairs.

In the boiler shop are to be found two large electrically connected planers, with which the boiler plates are trued, and which operate both ways, while the old steam system worked only one.

In this same shop will be found larger planers used for planing the outside of boxes; these machines are direct-connected to motors; next to these is a large radial drill, also direct-connected, then two large 12-spindle drills and a traveling crane of 10 tons capacity. Located in the western end of the boiler shop on the first floor will be found the large rollers used in rolling the heavy boiler sheets; these are connected by means of gears to series-wound reversible motors of 20 h.p. capacity each, which are set in pits in order to be out of the way and give clearance for the rolling of the plates, which is a very great advantage over the old belted and counter shaft system formerly used. These motors rest in a cradle supported on springs, which prevent any sudden shock to armature or gears in case the motors are reversed suddenly or the rolls stopped by any obstruction.

The brass machine shop is located directly over the boiler shop, or rather over that part occupied by the large rolls. This shop has four sets of two distinct lines of shafting, each set being operated by one 15 h.p. Gibbs motor with separate rheostats for starting.

In the repair shop there is one 5-ton traveling crane connected up to motors similar to those in other parts of the works. In the flanging shop will be found one 30-ton and one 20-ton traveling crane, each having a 50-ft. span. These were built by William Sellers & Co., and are of the 3-motor type.

In the foundry equipment will be found two electric traveling cranes of 5-tons capacity, together with one 10-ton jib crane and three 6-ton jib cranes; in addition to these, and running the entire length of the foundry, is an electric trolley crane used for conveying ladles of molten iron from one end of the building to the other.

In the foundry yard, which is utilized for storing the stock used in supplying the cupolas, will be found a pivot crane on a center column which transfers the material in cars from the ground to the tramway on the cupola deck. This is a 10-ton crane with a 30-ft. jib operated by a 15 h.p. motor, which was formerly run by steam, but the constant swaying from one side to the other, as the jib was operated, caused the steam connections constantly to break and make an endless expense in keeping the crane in working order, simply showing another obstruction overcome by the adoption of the electric motor. All the freight elevators in this section of the works are operated by electric motors, the capacity of elevators being 6,000 lbs. The Hindley worm gear is used and the motors have belt connections located at the top of the elevator shafts. Next in line is the annex to the cylinder shop, which contains two traveling cranes, one radial drill, direct-connected, with a Crocker-Wheeler motor, three punches and a radial drill, connected with motor by counter shafting and belt, one shearing machine and two punches, all of which are operated by motors.

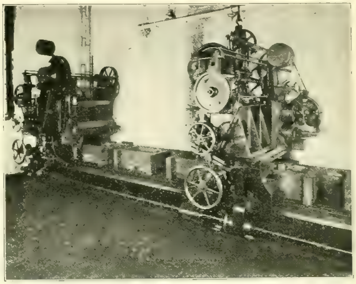
Located in the same building is the testing room with two of Olsen's testing scale machines and one other machine used for working to the standard size the metals to be subjected to test. These machines are run from a countershaft belted to a 7.5 h.p. motor of 220 volts. In this block also is located the flange shop power house, having one unit of 250 h.p. and connected in the circuit as shown on the general plan of location of building.

In the main cylinder shop are located seven large jib cranes alternating between the iron posts of the shop and in such a position that a load can be taken from the 5-ton walking jib crane which was made by R. D. Wood, of Camden, N. J. This is made to travel on two rails, 5 in. apart, along the floor, the top of the crane running between girder rails; and, on account of the long wheel base, the crane is self-supporting in direction of the track, but when the jib is thrown around at right angles with track both tracks at bottom and top hold it in position. It is the most handy jib crane in the shop as it travels from one end of the shop to the other.

This crane differs materially from the ordinary traveling cranes, inasmuch as the top guide strips are only about 2 ft. wide, and the current delivery to the motors is received from a regular trolley wire, one on each side of the top guide strips. This arrangement does not interfere with the counter shafts and posts of building which would prevent the use of the ordinary traveling crane. The motor arranged for the hoist is 7.5 h.p., series wound, and reversible, while the motor for the travel is shunt wound 7.5 h.p. and operated by a clutch.

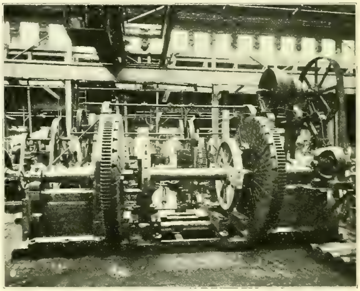
On Buttonwood street between Fifteenth and Broad is located, about 35 feet from the ground, a 25-ton traveling crane, which could be dispensed with only at a very great loss in labor and time in handling the material. The main hoist of this crane is 15 h. p.; speed 5 to 40 ft. per minute; bridge travel, 7-5 h.p.; speed, 200 ft. per minute; trolley travel, 3.5 h.p.; speed, 50 to 100 ft. per minute. The photograph will give a good idea of the class of work performed. When it is considered that before the introduction of the electric power all this heavy work of moving boilers, driving wheels on axles, etc., had to be done by horses, it is only one more proof of the great advance which is being made in this very important branch of shop equipment.

At the Seventeenth street shop a very striking contrast is seen between the belt connection and that portion of the first floor operated entirely by motor-driven tools, having direct connection.



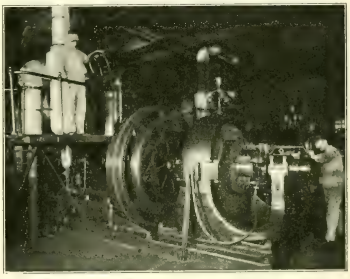
DOUBLE HEAD FRAME SLOTTING MACHINE.

On the first floor of this shop and on the east end are placed a double-headed shaper operated by two 5 h.p. Crocker-Wheeler motors, several radial drills, connected to 3.5 h.p. motors, there being 14 motors in all located in this shop. There is also one 25-ton traveling crane which runs from one end of the shop to the other. Not a counter shaft or belt can be found in this half

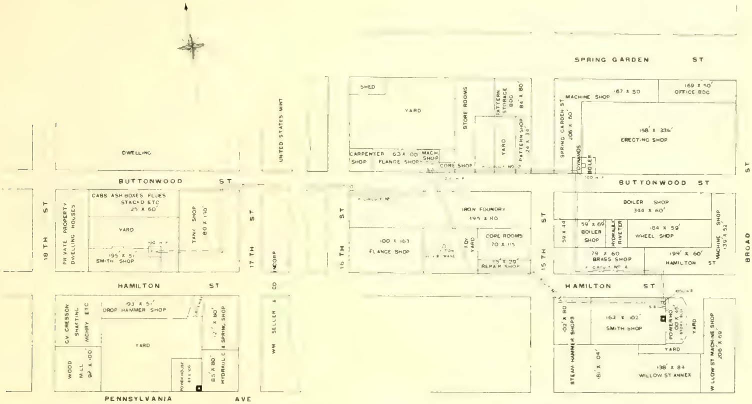


WHEEL LATHE.

of the first floor, which has a bright and very light appearance; while, directly opposite, on the west side of the floor, belts and counter shafts so obstruct the light as to necessitate the use of artificial illumination. On the top floor, known as the tank and paint shops, is located one 30-ton traveling crane, with two 15-ton trolleys which move all tanks and trucks from one track



INTERIOR VIEW OF POWER HOUSE.



PLAN OF BALDWIN LOCOMOTIVE WORKS, SHOWING ELECTRIC CIRCUITS (DOTTED LINES).

to the other. The large elevator which lowers the tanks, after they are mounted on trucks, is 16 ft. x 32 ft. and run by a 30 h.p. motor which is located on the fourth floor. This elevator is counterweighted 20,000 lbs., so that when lifting a 45,000-lb. tank the actual lift is only 25,000 lbs. When the empty car is ascending the counterweight causes the motor to be propelled beyond its normal speed, which makes it act as a generator, forcing current back into the line.

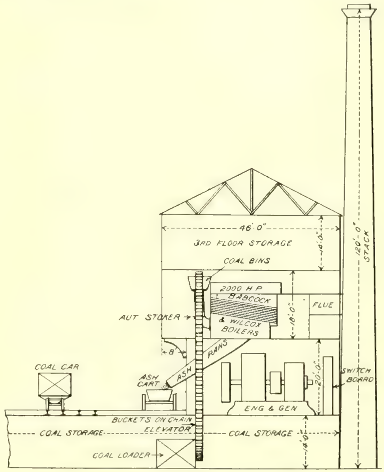
The Seventeenth street power plant has one unit of 100 h.p. capacity and so connected, with those previously spoken of, that they feed into the same mains.

The constant changing of motors from one tool to another prevents data being obtained as regards the particular make connected to any one machine.

As to the first cost of plant this undoubtedly is more under ordinary conditions than a plant installed with shafting transmission, but where a shop is run by the group-driving method the cost is not much more, if any, in excess of that of a belted plant. The first cost consideration very often becomes an insignificant one, as in this case of the Baldwin Locomotive Works, where the electric plant pays for itself every year through the great labor saving and rapid handling which it renders possible.

The 25 consolidation engines ordered by the Erie from the Baldwin Locomotive Works are to be delivered in June. They will weigh in working order 194,000 lbs., have cylinders 21 x 30 in., Richardson balance slide valves, driving wheels 62 in. in diameter outside of tire, Midvale tires, 30-in. Paige engine truck wheels, straight top boiler of carbon steel 69⅝ in. in outside diameter at smallest ring, made for a working pressure of 200 lbs.; Monarch boiler covering, Wootten fire-box of carbon steel, 114¼ in. long and 96¼ in. wide, 324 tubes, 2 in. in diameter; heating surface, 2,460 sq. ft.; fire-box, 188 sq. ft.; total, 2,648 sq. ft.; grate surface, 76 sq. ft.; tender wheels manufactured by the New York Car Wheel Company, 36 in. in diameter; iron tender frame; United States metallic packing, Magnus metal bearings, Westinghouse brakes, Kewanee brake-beams, Consolidation safety valves, Monitor and Metropolitan injectors, Ashcroft gauges, French springs and Dressel headlights.

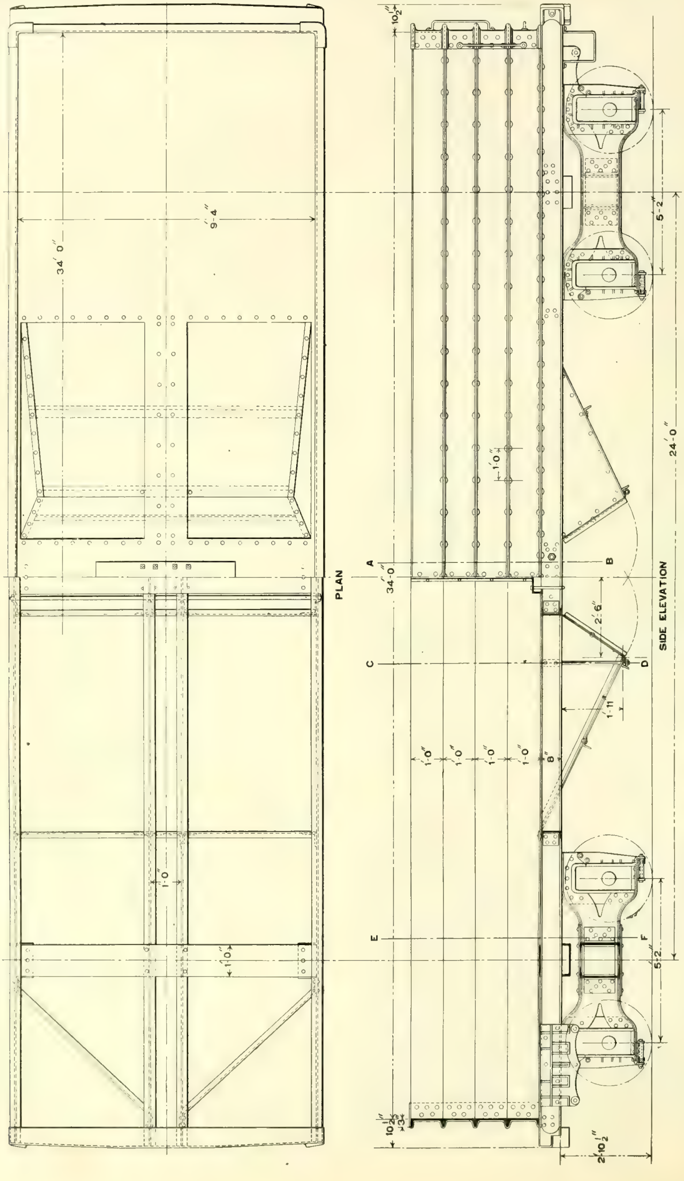
The Birmingham Age-Herald quotes President Elliott, of the Southern Car and Foundry Company as follows on the subject of the proposed new steel car plant for that company at Birmingham: "We are to build a plant at Ensley to make steel cars regardless of what disposition is made of the Memphis works. The Memphis car works have been idle for a long time and it was our intention to tear the plant down and remove it



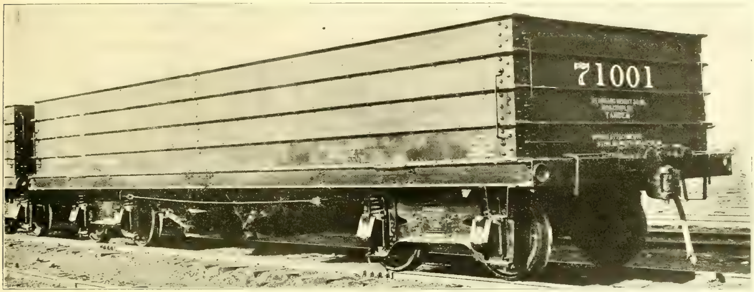
SECTION THROUGH POWER HOUSE.

here and to use such portions of it as were suitable in the construction of the new plant."

The following equipment has been specified on the 800 cars recently ordered by the Choctaw, Oklahoma & Gulf from the Mt. Vernon Car Manufacturing Company and the Southern Car and Foundry Company: Simplex body and truck bolsters, Tower coupler, Excelsior inside metal roof and Western car door. The same road has placed an order with the American Car and Foundry Company for five first-class chair cars, to be equipped with Pintsch gas and Safety Car Heating and Lighting Company's system of steam heat. These cars will be built at the St. Charles shops for June and July delivery.



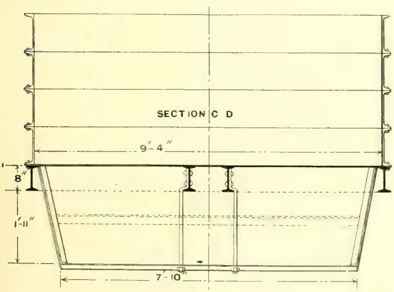
STERLINGWORTH ROLLED STEEL HOPPER GONDOLA CAR; DELAWARE, LACKAWANNA & WESTERN R. R.

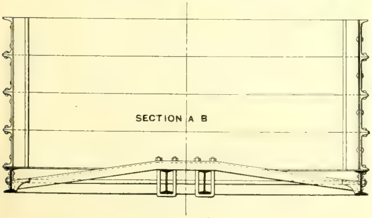


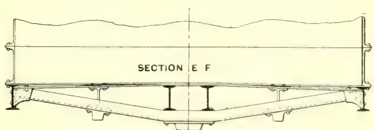
Sterlingworth Structural Steel Gondola Cars

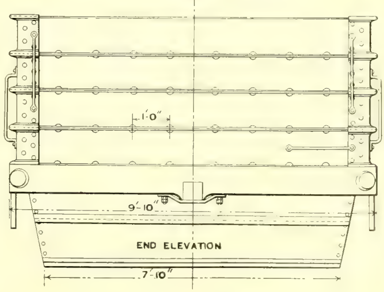
The Sterlingworth rolled steel hopper bottom cars, recently built by that company for the Delaware, Lackawanna & Western Railroad, are made almost entirely of commercial shapes. The sills are I-beams and the sides are channels. That feature should be conducive to rapid, substantial and cheap construction. The underframe consists of four I-beams, 8 in. deep, the two center sills being 12 in. apart, leaving a wide space for the hoppers. The stiffness required at the openings in the floor for the hoppers, made by cutting the floor plates, is secured by cross-braces between the sills, made of 8-in. channels attached by angle irons to the webs of the I-beams. The draw gear, which is the McKeen type, has in this construction the advantage of being so placed as to bring the line of pull nearly on the center line of the sills, which is, of course, the line upon which the pulling and buffing strains should properly come. The sill casting for the draw gear is bolted very securely to the center sills, being made to fit up close to the web, and grasp one side of the lower flange of the I-beam as does the end sill, and the corner plates. The portion of the draw gear casting which comes below the center sill flange is further secured by an angle iron, one side of which lies against the casting and the other fits tightly to the underside of the center sill lower flange. Each one is held in place by 21, ¾-in. bolts.

The end sills are malleable U-shaped iron castings with square corners outside, made with top and bottom flanges connected by five stiffening ribs between. The four sills are fitted into pockets cored out the exact shape of the I-beam, and the latter extend 6 in. into these pockets. It will readily be seen that this arrangement without being unnecessarily heavy or cumbersome is an exceedingly stiff form of construction. The body bolster is made of a 12-in. steel channel, with web on the underside. The space between the lower flange of the sill I-beam and the web of the channel is occupied by a suitable malleable iron filter. A pair of fillers also are inserted above the side bearings, and the whole is completed by a top cover plate which rests upon the top of the sills and is doubled over the flanges of the outside sills. The channel while passing under the center sills is bent up from them, so that the top of the channel flanges just reach the cover plate and are only separated therefrom by the flange









of the malleable iron bevel pocket which receives the ends of the body bolster channels.

The trucks are of the Sterlingworth rolled steel pedestal type, the details of which are covered by the Joughins and Cliff patents. The truck is a substantial piece of work, made, like the car, as far as possible, out of structural shapes. One noticeable and valuable feature is the jaw pedestal whereby wheels can be readily removed and applied without jacking car and truck up to an inconvenient height. This feature is sure to be approved of by the car repairer, who may have such work to do. The pedestal springs, which rest on top of the axle-boxes, are made so that while the outer dimensions conform to M. C. B. requirements larger sized steel is used in the coils. These have been furnished by the National Spring Company, of Oswego, N. Y.

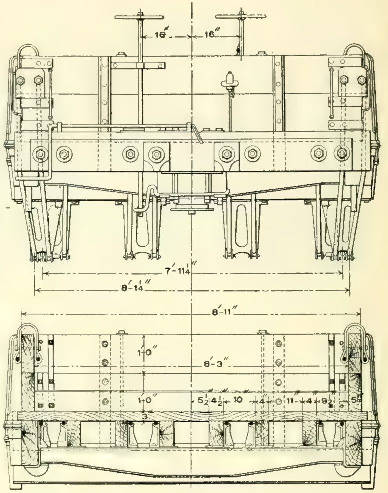
The sides and ends of the car are composed of 12-in. channels, four channels high, with webs flush on the inside and flanges turned outward and riveted together. By this plan the load never comes in contact with the rivet heads, and consequent wear to the rivets is avoided, and less friction is experienced when the load is being dumped out of the car. The ends of the gondola are of similar construction, and the corners are secured by malleable iron corner-plates which fit close to webs and enclose flanges in a manner similar to the way in which the end sills are fastened to the longitudinal sills. The corners are durable and stiff, and at the same time present a neat and workmanlike appearance on the outside. The brake-beams are Sterlingworth, and the Gould coupler specified by the D., L. & W. is used on these cars.

The light weight of the car is 32,400 lbs., and it has a capacity of 80,000 lbs. The I-beams in the sills weigh 20.5 lbs. per foot. The cross-sills or stiffening channels weigh 15.5 lbs. to the foot. The body bolster channel weighs 35 lbs. per foot. The car is 35 ft. 9 in. over end sills.

One of the chief points to be noticed about this form of construction is that the car and trucks are almost entirely composed of merchantable rolled steel shapes, the advantages of which are obvious.

The Sterlingworth Railway Company's plant is situated at Easton, Pa., and it is being enlarged to provide facilities for meeting the constantly growing demand for the several well-known Sterlingworth products.

Since the cars, described above, were built, the company has received orders for similar cars from the New York, Ontario & Western and the Mexican International railways.



Low Side Gondola Car; Lake Terminal Railroad

The Lake Terminal Railroad Company of Lorain, Ohio, has some extraordinarily long cars for the purpose of carrying rails. As it is for this special purpose and is not used in interchange, the general features of construction may be of interest to our readers. The underframing consists of eight wooden sills, the two outside ones being deeper than the intermediate or center sills. The car is 66 ft. 4 in. long, and will therefore carry two lots of 30-foot rails at the same time—in fact, for the special purpose for which it was designed this car has practically the carrying capacity of two flat cars. In appearance it resembles a long, low-side gondola, but its sides and ends are for the purpose of stiffening the sills. Along the sides are 12 stakes, held on the outside sills by ordinary stake pockets, the stakes being bolted to the sides. The side planks, 4 x 12 in., are bolted down to the outside sills by long ¾-in. bolts, which pass from the top edge of the side planks to the bottom of the side sills.

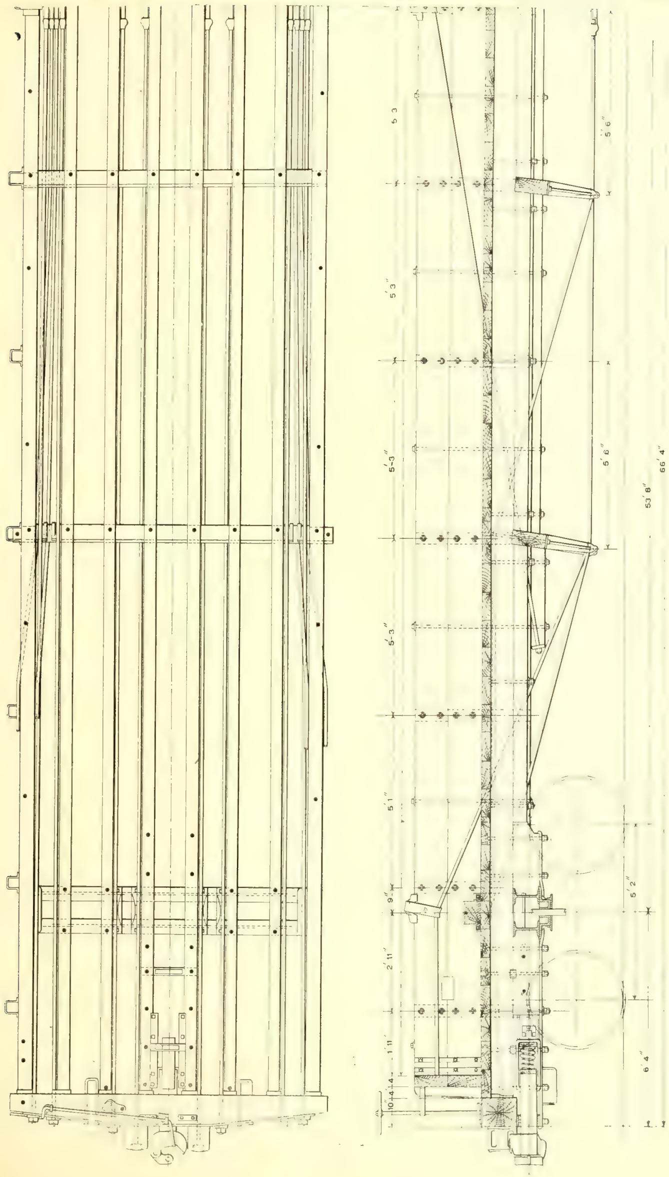
The trussing of the car presents an interesting feature. It is supported by 12 truss rods 1¼ in. in diameter. The six central ones pass in from the end sill over a bracket which rests upon the body bolster and down to a deep bracket placed on a needle-beam, inclined so as to squarely meet and transmit the upward effort of the tightened truss rod. The next pair of truss rods are those which lie closely along the inside of the outside sills. They also pass in from the end sill, and over brackets which stand on the body bolster, but instead of dipping down under the car from this point as the others do, they are carried along under the floor of the car, and reach their point of deflection when they come to the inclined needle-beam which forms with its bracket the queen post in the trussing system employed with the other six rods. These outer rods pass down to inclined needle-beams of their own, placed 11 ft. apart, in the center part of the car and form the system which in part stiffens the side sills. The side sills are further stiffened by four other truss rods which originate on the ends of the car itself about 14 or 15 in. above the floor level; these pass along close to the wide planks forming the car sides and in passing through a sling find their point of deflection immediately above the body bolster; from that point they pass down to and under the bracket on the needle-beam along with the six rods which support the intermediate and center sills. All the rods are tightened by the turning of a right and left screw-threaded turn buckle in the center. A special set of four truss rods, embodying the king-post principle, are run up on the outside on each side of the car. They begin at the end of a packing piece which runs out from the needle-beam of the six central rods and passing up along the car sides find their highest point in passing over a sling support exactly in the center of the car. The car has thus 16 truss rods in all.

These cars have been found very satisfactory in the special service for which they were designed.

Frederick Swift & Co., Old Colony Building, Chicago, have surrendered their contract as railway sales agents for the Boston Woven Hose and Rubber Company, in order to more completely devote their energies to the development of the Perry Brown malleable iron journal box. Swift & Co. are to manufacture as well as market the Perry Brown box in the United States.

The Seamless Tubes Company of Detroit has commenced to manufacture its product, and is said to be producing a very high-grade article. The company will proceed conservatively for a time in order to tune its works up to a uniformly high standard. Mr. W. N. Thornburgh may accept charge of sales for the company.

A. M. Crane & Co., of Chicago, have purchased the patents of the simplex car and truck jack, and will henceforth handle its sale. Mr. Walter B. Templeton, the inventor and former owner of the device, has joined the staff of A. M. Crane & Co., and will have charge of the new department.



LOW SIDE GONDOLA CAR FOR TRANSPORTATION OF RAILS; LAKE TERMINAL RAILROAD.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Bascule Bridge at Chicago

Engineering News, Jan. 31, 1901, p. 75.

This article describes a bridge of the bascule (or balanced lever) type, to be built at Claybourne Place, Chicago. The design was prepared by Mr. Edward Wilmann, city bridge engineer, and Mr. John Ericson, city engineer. The general description is given as follows: The bridge will be of the fixed center, double leaf bascule type, 125 ft. long from center to center of pivot bearings and 120 ft. center to center of piers, with a clear channel width of 100 ft. between the pile protection works. Each leaf will have three through trusses operated by racks on their curved heels, and heels descending into pockets in the abutments when the bridge is open. The clear headway above the normal water level is 16 ft. 6 in. at the center. The channel will be dredged to a depth of 17 ft. and eventually to a depth of 21 ft. The total width of the structure will be 60 ft., the trusses being 21 ft. center to center, and the sidewalks being carried by 9-ft. cantilever brackets. The pivot bearings are 4 ft. back from the center lines of the piers and are carried by box girders spanning the tall pits in the abutments. The approaches are carried by 10-in. and 12-in. I-beams supported by plate girders resting on the box girders, and extending from the river piers to masonry abutments independent of the abutments of the moving span. The approach roadway is paved with 6½-in. paving blocks on 1 in. of sand laid on a concrete base upon steel buckle plates (with convex side upward) between the floor beams. The sidewalks are concrete. The moving part of the bridge has a wooden floor for both roadways and sidewalks. The bridge turns through a maximum angle of 76 degs. 58 min., which requires a travel of 35 ft.

The article further describes in detail the substructure, the superstructure, the trunnions and racks, material and workmanship, loading, supporting girders and approaches, the operating machinery, center locks, end locks and buffers, gates and signals and the indicator. The illustrations give an elevation of one side with a skeleton opposite, which is figured from the strain sheet, the floor system and details of the center locks. A comprehensively illustrated double page inset accompanies the article.

Time Element in Loading Carts

Engineering News, Jan. 17, 1901, p. 54.

"The Time Element in Laborer's Work" was the subject of Mr. George H. Parker's paper at the seventh annual meeting of the Connecticut Civil Engineers' Association, held at Hartford Jan. 8. Speaking of loading earth into cars he said that while from 10 to 12 cubic yards per man was usually considered to be a good day's work, the men at Kenny Park, Hartford, were loading 20 or more with no more exertion than was required to handle the less amount. Mr. Parker, who is superintendent of the new Kenny Park, explained the method by which this desirable increase of output was obtained. In doing this he assumed conditions all favorable to the working of the system. These were a bank of sand so loose as to need neither picking nor plowing, plenty of room for teams and men and one cubic yard the load. He found by experiment that 150 shovelfuls of sand made one cubic yard. If each man put in five shovelfuls it would take 30 to handle a yard. He put 31 men to do the work of 30, as he found that one-thirtieth of one man's time was not efficient, and this extra one man's time was found to be most profitable in the crew. He allowed 50 seconds for putting in the five shovelfuls, or one shovelful in 10 seconds. Practically each man worked 25 seconds and rested 25 seconds. To this quick work and the absolute and unquestioned right to rest, he ascribes the success of the system. The men, he found, worked most quickly in the morning, slower in the afternoon, slowest at night. Other things being equal, Monday was the laborer's best day, and Saturday his worst. Five shovelfuls in 50 seconds, after deducting 5 per cent. for waste time, is equivalent to 24.8 cubic yards per man per day.

The men were no more exhausted in loading 22 yards in this way than in loading 10 under the old system. This fact is not entirely due to alternate work and rest. A man working alone does not do as well as when he is one of a squad. Alone he has only his own spirit to support him, but when he is one of five he has not only his own spirit, but the sustaining spirit of the others which results from association in a common purpose. Another feature which is thought to lessen fatigue is that the counting the shovelfuls for himself by each man occasions some mental activity, as he is as liable to get into trouble for putting in one shovelful too many as for one too few. There is no shirking, as each man does the same amount of work, and there is always present the stimulation of a mild competition, as no man wishes habitually to put in the last shovelful. With interest aroused, the labor ceases to be drudgery.

The arrangement of teams to work in unison with this system was such that all carts must enter the pit with exactly the same time interval intervening. For a quarter-mile run, loading at the rate of one cubic yard in 50 minutes, it would require the service of nine teams. A table is given showing the cost per cubic yard, with different lengths of time taken in loading. The greatest gain is said to come with a loading time not exceeding one minute, and not less than 40 seconds. If over two minutes there is little or no gain with the shovelers, but there is in the carting. The cost at 40 and 50 seconds loading time is given at 6⅔ cents. It was found that although the men could stand the work the teams could not, unless permitted to rest just before entering the pit.

The driver, not being able to leave his seat, had the hardest work of all. An explanation of the method of management to make the system practical closes the article.

Preservation of Railroad Ties

Railroad Gazette, Jan. 4, 1901, p. 7.

This article is an extract from the discussion upon Mr. Chanute's paper on the present state of the art of preserving ties, which appears in the Proceedings of the American Society of Civil Engineers for September. Mr. S. Whinery said that a great deal more importance attached to the proper selection of wood, to be treated, than is usually supposed. This careful selection of the timber and its proper preparation by seasoning before being treated, has much to do with the success of the process. It often happens that anything is considered good

enough to be creosoted, even partly decayed timber has been so treated, with unsatisfactory results. Careful selection and preparation of the timber are essential to the success of the process. Few inspectors can distinguish between long leaf yellow pine and bastard pine when dressed and delivered on the road as ties. Out of a lot of ties put into the track, some will be found to fail in four, five, six, eleven or twelve years, and this difference in durability is probably due to variation of quality.

Mr. S. M. Rowe said in regard to the creosote process that owing to the difficulty of procuring suitable oil, and from its cost the process is virtually ruled out, in this country, except, perhaps, in special work required to protect timber against the *teredo* (ship-worm). This is also true in some degree of the zinc-creosote process of Mr. Rutgers, which is highly spoken of in the paper.

The article continues that the writer's experience on the A. T. & S. F. in this connection may be of value. In 1880 a portion of the Southern Division of this road was laid with the original mountain pine ties, and within six years the right of way was strewn with removed ties, or rather with masses of rotten timber, which were too far gone to be used as locomotive fuel. From this experience with untreated pine ties a life of four and a half years was all that could be deduced. In July, 1885, the Las Vegas Timber Treating Works were installed and have been in constant operation since. Although the record of the life of treated ties is too limited as yet for definite estimate, it furnishes a basis for a statement (by the law of averages) by which the probable mean life can be estimated. On the assumption that the mean life is twelve years, it is found that of the earlier treated ties not anything like the numbers that should have perished have been removed, so that it is proper to assume that twelve years is too low. The advisability of drawing high requirements as to the quality of the timber of this country is not clear. The supply comes from inferior woods, and even with oaks, the better selected portions go for other purposes leaving only the inferior grades for ties. In consequence of all this, soft and inferior woods, treated so as to improve their lasting qualities, even beyond that of the best oak, will be sought. Thus a much enlarged field of supply is opened, together with a reduction of cost, and a very marked reduction in the cost of maintenance. Another point is the sawing of ties from large logs, which make good ties on account of the superiority of the timber, and its lasting qualities, compared with the sap-pole made from the same kind of timber. Conditions being equal the former should last one-half longer than the latter.

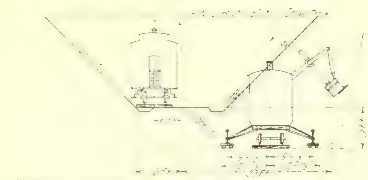
Thorough drainage of the roadbed is an important factor in the life of ties. In moist climates treated ties should be allowed to dry thoroughly before being placed. The thorough impregnation of the timber by the antiseptic is insisted on as an essential of the work, so far as the Burnett or the zinc-tannin process is concerned; and the application of a stronger solution, superficially, will not make up for lack of permeation as it is not known that the chloride will diffuse in time. Steaming under pressure is the best and most effective means of securing thorough permeation. Over steaming will sometimes reduce the amount of absorption of the solution, but the permeation will be more perfect.

The writer says that taking the white oak tie as it runs, there is a strong probability of doubling its life. The idea that oak will not absorb sufficient antiseptic to do any good is a mistake. The paper concludes with a few remarks about the gradual exhaustion of the timber supply. Tie renewals in this country amount to nearly 70,000,000 annually, as against 4,000,000 in France; the ratio will increase as the mileage increases. Although our forests seem boundless, they are not so, relatively; and at the present rate of consumption the scarcity of cross-ties, now beginning to be felt, will soon be serious.

Some Methods of Grade Reduction

Railway and Engineering Review, Jan. 19, 1901, p. 31.

Mr. M. L. Lynch, Chief Engineer of the St. Louis Southwestern Railway, has furnished a sketch showing the characteristics of steam shovel operations on that road, in deepening cuts and grade reductions. The order of procedure in the cut is to throw the main track off the center as far as possible; probably 6 ft. will be so gained. The main line is used



Method of Steam Shovel Working, St. Louis Southwestern Ry.

for passing traffic and for a loading track for the shovel. After the first cut has been taken out, the shovel is put on the main line and traffic passes over the line formerly occupied by the shovel.

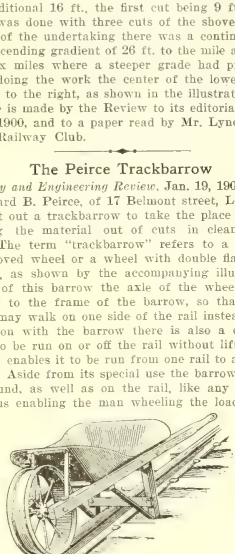
The particular piece of work to which the sketch refers was a summit cut having an original depth of 16 ft.; this was lowered an additional 16 ft., the first cut being 9 ft., as shown. The work was done with three cuts of the shovel. After the completion of the undertaking there was a continuous ascending and descending gradient of 26 ft. to the mile and for a distance of six miles where a steeper grade had previously existed. In doing the work the center of the lowered line was moved over to the right, as shown in the illustration.

Reference is made by the Review to its editorial in the issue of Dec. 1, 1900, and to a paper read by Mr. Lynch before the St. Louis Railway Club.

The Peirce Trackbarrow

Railway and Engineering Review, Jan. 19, 1901, p. 40.

Mr. Edward B. Peirce, of 17 Belmont street, Lowell, Mass., has brought out a trackbarrow to take the place of push cars for running the material out of cuts in cleaning railway ditches. The term "trackbarrow" refers to a wheelbarrow with a grooved wheel or a wheel with double flanges, to run on the rail, as shown by the accompanying illustration. In the design of this barrow the axle of the wheel is set at a slight skew to the frame of the barrow, so that the person pushing it may walk on one side of the rail instead of astride. In connection with the barrow there is also a device which enables it to be run on or off the rail without lifting, and another which enables it to be run from one rail to another without lifting. Aside from its special use the barrow may be run on the ground, as well as on the rail, like any other wheelbarrow, thus enabling the man wheeling the load to dump it



The Pierce Trackbarrow.

at desired points away from the track; whereas, in unloading from a push car the material must be shoveled off and unloaded near the track.

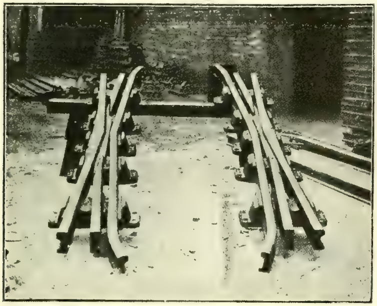
The utility of this device is readily apparent to trackmen. In the spring time, when the thawing of the ground fills the ditches with mud, the usual method of cleaning them out is to either run the material out on a push car or lay planks outside the rail and wheel it out on barrows. On a busy road the use of a push car in such works entails a considerable loss of time, as the car must be protected by flagging, and much time is lost in lifting the car off and on the track and waiting for trains to pass. The moving of a long string of planks from point to point to serve as a runway for ordinary wheelbarrows also consumes a good deal of time. When using the trackbarrow there are no planks to bother with, and as it can be set off the rail quickly there is but little delay in wheeling out the mud occasioned by a necessity to wait for trains.

Railway Switches and Crossings

Transport (London), Jan. 18, 1901, p. 55.

The admittedly excellent permanent way of British railways has, comparatively speaking, its weak points. To remedy these defects Mr. Price-Williams, the well-known railway engineer, in co-operation with Mr. E. P. Martin, who is equally well known as an iron and steel manufacturer, has designed and patented a new system of constructing switch tongues and crossings, which is just about to be tried on the Midland Railway.

The new methods illustrated herewith, are simple in the extreme. For the manufacture of crossings a rail of double the ordinary width is rolled, split up from both ends, and opened out to the required width, and then the "flange path" is planed out. By this means the continuity of the main line rails, both



in the case of the acute and obtuse crossings, is maintained, thereby largely adding to the strength, safety and durability of the road. The crossings themselves, consisting of fewer parts, are of greater strength and more durable than those in use at present.

The manufacture of the patent switch tongues is by rolling an ordinary rail to a taper, instead of planing the rail, as now obtains. By this system, the original sectional area of the rail is practically maintained throughout, largely adding thereby to its strength, safety and durability. In addition to this, the use of the planing machine is avoided, and the skin, or original rolled surface of the rail, is preserved, a matter of great importance, as the strength and durability of the tongue rail is thus increased.

Railway Signaling

Transport (London), Dec. 21, 1900, p. 535.

At the meeting of the Institute of Civil Engineers, held on Dec. 11, 1900, papers were read on signaling on the Waterloo & City Railway, and a note on signaling outlying siding connections by Mr. A. W. Szlumper. The Waterloo & City Ry. is an electrically worked underground line, 1½ miles in length, with double track in two separate tunnels. Trains run every six minutes, the journey occupying six minutes. There are two signal cabins, one at Waterloo and one at the city. The line is practically divided into two block sections by provision of signals about half way between the stations, such signals consisting of an electric lamp fixed on the wall and electrically controlled from both boxes and by clearance bars or treadles. In addition to the ordinary mechanical interlocking the Sykes electric lock-and-block system had been largely introduced, and as a further safeguard "slipper bars" were fixed a short distance in front of the more important signals by means of which the current to the electric motors was automatically cut off should a train pass the "slipper bar" when the signal was at danger. A detailed description of the system follows:

A second paper describing some modern methods of electrically controlling outlying siding connections was read by the same gentleman. One system described was applicable to a railway where an electric lock-and-block system was installed. Another system described consisted of a provision of a ground box and outdoor signals at the siding, locking instruments being provided at both the section and siding boxes. The next system described consisted of the provision of a ground box and of outdoor signals at the siding connection.

THE "LIVERPOOL OVERHEAD."

Mr. S. B. Cotterell, in the third paper presented, described the system of automatic signaling in use on the Liverpool Overhead Railway. This elevated road, originally promoted to facilitate passenger transit to and from the docks, has developed into a line nearly seven miles long. In addition to fulfilling its original purpose, it has provided rapid access to Liverpool from two important suburbs and by means of an electric tramcar system, owned by the company, from the other suburbs. When the line was first constructed as a dock railway, with many stations, automatic electric signals had been introduced, in order to avoid the expense of men and maintenance, but with the extensions in the suburbs the automatic system had to be supplemented at termini and junctions by ordinary mechanical signals. The intermediate sections were divided into fourteen block sections; each block had a station at its commencement, and since the length of the blocks was short, each station was equipped with only four signals, viz., one home signal and one starting signal for each track, the starting signal being practically the distant signal for the station in advance.

A train leaving a station passes the "breaking" contact, putting the starting signal to "danger"; it then passes the "making" contact, which pulls off the home signal of the station it had just left, and the starting signal of the station in the rear. The circuit between the making contact and the other signals is made through a switch fixed on the arm of the starting signal, so that should the latter fail to go to "danger" the circuit could not be completed and the line behind would be blocked. The making and breaking contacts are actuated by a striking board fixed on the last coach, so that should a train break in two, the signals would not be operated. This automatic arrangement is applied to all intermediate stations, and where the automatic system merged into mechanical, the alteration has taken place at the home signal in one direction, and at the advance starting signal in the other, that is, on the up road the advance starting signal is the first automatic signal, and on approaching the termini the distant signal is the first mechanical one.

The concluding part of the paper is devoted to a consideration of the quantity of electric energy required to operate the system.

Locomotive Equipment, Appliances and Related Matters

Effective Lubrication of Driving Boxes.

American Engineer and Railroad Journal, January, 1901, p. 4.

Many of those who have experimented with the method of oiling driving boxes at the side think that plan to be superior to the old style whereby oil is introduced at the top of the bearing, where the heaviest load is carried. In introducing oil at the side there is the liability of the groove to become obstructed with dirt or pieces of waste. The Master Mechanics' Association committee, reporting last June on this subject, recommended cutting the clearance space 1¼ in. above the center of the axle, when its diameter is 9 in., and others in proportion. The committee also recommended that the side oil grooves be cut a little below points 45 deg. from the top of the bearing. If the grooves are placed too low, the oil will run down past the axle into the cellar. Five heavy consolidation engines with side oil grooves too low down recently had them raised with most satisfactory results.

On L. S. & M. S. passenger engines the cut shows only one side oil groove, placed at the back part of the bearing. These engines make most of their mileage running ahead. A similar groove in the front of the brass would do no harm in forward running, but it would conduct oil directly to the cellar.

Attention is directed to a matter closely associated with the location of the oil grooves; that is, the cutting away the bear-

ing surfaces of the brasses at the sides near the center of the axle, where no weight can be carried. This part of the brass plays no useful part. It tends to rub off oil, and causes the brass to grip the journal when heated. Two cuts of boxes, with side oil grooves and no top oil hole or space, are given, designed by the Schenectady Locomotive Works. A Lake Shore box and one of the Chicago Great Western are also reproduced. One of the Schenectady boxes and the Lake Shore box are contrasted in the matter of clearance. The former have the clearance cavity made by straight, vertical cuts, extending ¾ in. above the center of the journal, while the latter is shown to have a radial form extending 1½ in. above the center. The radial clearance preserves a cavity of uniform width between brass and journal. The straight cut produces a cavity which is wider at the top than at the bottom. The writer does not know whether waste and dirt have collected in straight cut cavities, but the radial cutting is done to avoid such a possible contingency. The Lake Shore box has another interesting feature. There is a cavity at the top of the brass ⅞ in. wide by ¾ in. deep, filled with asbestos boards saturated with oil and graphite, laid on edge and driven tightly into place. Oil is fed through two ⅝-in. holes opening into the large oil cavity on top of the box. The idea in this arrangement seems to be to get oil to the journal without sacrificing bearing area on a heavily loaded journal. The writer points out that this departure is still in its experimental stage, and that it is a question which way the oil will pass through the asbestos, up or down, or if it will pass at all after it has been some time in use.

The side oil groove in the L. S. & M. S. box is shown in the cut, the upper edge is chamfered off, which increases the width of the groove from ½ to ¾ in. This width of groove and and chamfered edge seem to be effective in preventing the collection of dirt.

One further point brought out is that heating will occur if the side pressure of hub and box become excessive. The best practice seems to be, even if liners are used, to allow considerable side play. On one road this amounts to ⅜ in. If side play is not given to an engine in the first place she usually takes it herself in the shape of wear of box, hub or sharpening of the wheel flanges.

The Vanderbilt Locomotive Boiler

American Machinist, Jan. 17, 1901, p. 54.

At the second meeting for the season of the Junior Mechanical Engineers, Mr. Cornelius Vanderbilt read a paper on the development of the locomotive boiler, and especially of the Vanderbilt type, which he had designed and put into successful operation. He said, in beginning, that "the locomotive boiler had been developed less since its inception than any other important invention." The Vanderbilt furnace is a radical departure from the rectangular or parallel-sided furnace. The principal argument in favor of the Vanderbilt fire-box is that it dispenses with the use of staybolts, and the avoidance of the dangers, delays and expense attributed to them. "The paper gave," this article tells us, "apparently with perfect fairness and with marked absence of inventor's bias, the results of various tests which were quite favorable to the Vanderbilt boiler. The speaker showed himself perfectly familiar with locomotive practice and gave a good impression of himself as a promising young engineer."

Mr. Angus Sinclair praised the efforts of the young engineer. Mr. Forney spoke in a general way of the perennial controversy between himself and Mr. Sinclair concerning locomotive furnaces and kindred matters, and Mr. Warren E. Hill, of the Continental Iron Works, spoke of the rolling of the Vanderbilt corrugated furnaces.

Traveling Boilermakers and Blacksmiths

Railway and Engineering Review, Jan. 12, 1901, p. 23.

In an interesting article covering a number of topics called "Shop Talk" the Review says:

"We note a query in one of the railway clubs as to whether or not a traveling boilermaker and a traveling blacksmith would prove a paying investment on a large system. We are hardly prepared to believe that it would. The general experience with 'traveling' officials is that they soon lose their enthusiasm, get talked out, degenerate into mere gossips or demoralizing meddlers, and in all do more harm than good. A better plan would seem to offer itself in providing a systematic interchange of visits between the foremen of different shops. The men appreciate an occasional opportunity for such interchange of ideas and enjoy the relaxation, while the confidence in them shown by such a course leads them to improve their own shop in order to have something to brag about. In such a manner a friendly rivalry is stimulated which gives better results than an engendering of a hostile spirit which the traveling official often arouses. The master mechanics will look after the 'standards.' "

Why Do Boiler Tubes Leak?

Engineering Times (London), January, 1901, p. 418.

This article is an editorial somewhat in reply to the inquiry contained in the caption which the Railway and Engineering Review asks. The writer discusses the question why will a set of tubes give satisfaction for some years while one kind of water is used and leak badly when another kind is used. The usual explanation is put down to the expansion and contraction of the tubes under the influence of the changing temperature of the fire-box. When amplified, the explanation is that in a locomotive firebox when the engine is working hard, the firebox temperature and that of the gases passing through the flues is high. Under this strong heat the tubes expand longitudinally more than does the cooler shell of the boiler and the tendency is for the beads to be pushed away from the sheet into the box. At the same time the tubes, ferrules and tube sheet are also in a state of expansion, leaking does not take place until there is a reduction in the intensity of the heat. Some of this expansion is then lost, and as the relation of beads to sheet has been strained the tubes leak. When once a leak has been started it is difficult to restore the expansion necessary to make the tubes "take up." Caulking or rolling thins the bead stocks and tends to crystallize the metal. It also thins out the copper ferrule and aggravates the tendency to leak. All this does not explain why a tube good in one water leaks in another.

The editorial writer states his personal belief that the action described is not sufficient in amount to affect the question of leakage of much measure; "otherwise," he says, "tubes would give trouble in all waters." The point of importance is that the expansion of the tube cracks away the scale which otherwise covers up the inner junction of tube and sheet. This makes it possible for water to reach the copper ferrule, and bad water then acts chemically upon the ferrule through its relation to the iron. This theory would account for tubes, tight with one water, leaking with another, especially when there has been no incrustation to break away. If this is so, it is argued, a ferrule made of iron as nearly as soft as copper as it can be, would give better service with bad water.

The use of the ferrule is to form a sort of packing which will permit a slight amount of motion of tube in tube sheet, and the difference in the coefficients of expansion of copper and iron is so small that the use of a soft iron ferrule would be equally as good as copper in this respect, and would be better from the fact that there would be no possibility of chemical or galvanic action. Waters which cause leaks where no incrustation exists appear to have some such action, and the leaking cannot be attributed to a species of mud burning. The writer thinks an experiment in which soft iron ferrules should be used, would be worth trying as it would prove or disprove his theory.

An experienced chemist is quoted as saying that on oil entering a boiler the carbon constituents of the animal ingredients in the oil immediately separated and sought the points of greatest heat, viz., the flue bead. The incrustation being broken away around the tube this carbonaceous matter has free access to the ferrule. In light working of the joint, the carbon enters in between iron and copper. This film, which may be seen on a ferrule taken freshly from a boiler which has been in service some time, works toward the bead and assists in burning out the copper ferrule. Color is lent to this opinion from the fact that ferrules are generally found to be greatly corroded at the bead side.

An examination of the inside of the tube sheet with tubes in place shows that even a badly incrusted sheet has the scale cracked away around the ferrule, so that the ferrule is always accessible to the action of the water. Corrosion cannot be due to heat alone because the ferrule is protected by the bead, and with good water corrosive action is very much reduced. Water heavy with incrusting material will soon produce leaky tubes, due to slight mud burning. In concluding, the writer in advocating a trial of the soft iron ferrule in a locomotive boiler, insists that the ferrule shall be made completely of iron and not brazed and that it should approach copper in point of softness as closely as possible. Expressions of opinion on the subject are invited by the writer.

Tests of a Locomotive Boiler

Railway and Locomotive Engineering, January, 1901, p. 16.

There are many changing conditions in the operation of a locomotive boiler in actual service. These changing conditions were reproduced as far as practicable in a test of a locomotive boiler made at Purdue University, which institution is well fitted to attempt a scientific, accurate and reliable test. The boiler tested was that of No. 1 Schenectady engine; it is of the wagon-top type, 52 in. diameter in the waist, has 200 2-in. tubes, 11 ft. 5 in. long, with 1,346.9 sq. ft. of heating surface, of which 142.6 sq. ft. are in the fire-box. The grate area is 17.25 sq. ft. and the cylinders are 17 x 24 in. There were particulars of 35 tests given, the duration varying from 68 to 225 minutes. The boiler was designed to carry 140 lbs., gauge pressure, and the average during the tests varied from 98 to 155 lbs. per square inch. The well known and able Professor Goss made the tests.

The plan of test was to so work the engine that the quantity of water evaporation should be increased with each succeeding test, so that the efficiency of the boiler might be ascertained under the varying conditions of service. In all the tests an effort was made to keep the injector working continuously, but in the first few tests it had to be shut off occasionally. The first test gave 5,525 lbs. water evaporated per hour, and in the last it was 14,937 lbs. per hour. This rate was approximately 250 lbs. per minute, and was sufficient to have evaporated the entire contents of the boiler in 34 minutes. At this rate, without the injectors the water level would have fallen at the rate of 1 in. per minute, as measured between the upper and middle gauge cocks. This fact demonstrates the extreme importance of having thoroughly efficient boiler feeding appliances on locomotives. In the thirty-fifth test the boiler transmitted to the water 288,000 heat units per minute, or heat sufficient to have raised 144 tons of water through 1 deg. of temperature in one minute. During these tests the temperature of the air, water and smoke-box gases were taken, also the temperature of the smoke-box under varying conditions, and the character of the steam was noted. A calorimeter of approved form, taking steam from a perforated pipe extending into the dome, was used. From this it was found that the steam was fairly dry, though there was considerable variation. The indications showed that the amount of moisture in the steam increases with rapidity of evaporation. Professor Goss concludes that steam from a locomotive boiler is comparatively dry, though it is often credited with carrying over a good deal of water to the cylinders. The tests show this does not happen under running conditions. When it does happen, he thinks it is probably due to too high a water level, or to a sudden demand upon the boiler. For example, if the throttle of a locomotive which has been for some time inactive be suddenly opened, or if an engine working with light load be suddenly required to increase its power, moisture will be carried by the steam, but under uniform conditions, such as obtained during the tests, the quantity is never great. Professor Goss believes that it is fair to conclude that variations of moisture are largely due to incidental conditions, no serious mistake would be made by disregarding the indications of the calorimeter, and all calculations may be based on the assumption that the steam was dry and saturated.

The coal used was Indiana block, light and friable, which burns without clinkers. It holds 50 per cent. of fixed carbon and 40 per cent. of volatile matter. The quantity of coal fired per hour varied from 729 to 3,133 lbs. The rate of combustion per square foot of grate ranged from 49 to 182 lbs., which is less than that on many road engines, but is relatively high when compared with marine boilers, which under forced draught rarely burn more than 60 lbs. per hour per square foot of grate, and stationary boilers seldom burn more than half that amount. The evaporative performance of the coal varied from 10.29 to 6.39 lbs. of water to one of coal; the lower figure was obtained when the water evaporated was greatest. Careful attention was given to the flow, speed and temperature of the furnace gases. The vacuum in smoke-box varied from 1.7 to 7.5 in. of water. The vacuum was much altered by the opening of the fire-box door or the closing of the dampers. A thick, solid fire or closed dampers was found to raise the intensity of the draft, while reversed conditions produced a contrary result. These facts are commended to the attention of locomotive men as bearing very strongly on fuel economy. Smoke-box temperatures varied from 550 degs. to 798 degs. F., which was low, but probably correct. The article concludes: "Professor Goss contended that, other things being equal, the capacity of the jet as a means of producing draft is nearly proportional to the weight of steam discharged per unit of time; that it makes no difference whether the steam be exhausted in light puffs common to high speed or in the heavy puffs incident to slow speed and heavy work. This does not agree with our experience, and we do not think men who have had experience in running locomotives will indorse that part of the paper."

Progress of the Two-Cylinder Compound During the Past Ten Years

Railroad Gazette, Jan. 25, 1901, p. 60.

Mr. C. J. Mellin, chief engineer of the Richmond Locomotive Works, contributes an interesting article on this subject. He says that the real effort to introduce the double expansion principle dates back about 10 years ago, and that at first engineers and designers had not only to solve the problems presented in the new form of mechanical construction, but had also to combat much conservatism and prejudice. Both the difficulties and obstacles in the way have now been removed.

The first requirement for the compound was the application of a reliable starting device, and this requirement has been met, giving the compound, not only an equally reliable, but a starting power superior to that of the simple engine. The compound when successfully in operation, and showing the anticipated saving in fuel, gave evidence that an improvement was required which would obviate two defects which developed when the engine was running down hill, shut off, or what is technically known as "drifting." The defects were that the large area of the low-pressure piston being comparatively so large, a volume of air was at each stroke delivered through the exhaust pipe into the smoke-box, and in passing out stimulated the draft on the fire and burned coal and generated steam at a time when neither was desirable. A suitable by-pass valve which connected each end of the cylinder obviated the difficulty, but a second trouble produced by the very obviating of the first trod close upon its heels. The next trouble was the suction of soot and smoke-box gases into the low-pressure cylinder when the engine was "drifting." This was corrected by the application of an air passage, connecting the main exhaust port with the atmosphere on the side of the cylinder saddle, which passage was controlled by a check valve which closed upon opening the throttle as did the steam chest relief valve.

The engine now seemed to be all that could be desired at moderate speeds, but it was discovered that the power diminished rapidly as the speed increased above 35 or 40 miles per hour, and the saving in fuel became less in about the same proportion, while the ordinary slide valve was used.

Improved steam distribution in the low-pressure cylinder was therefore in order. A suitable piston valve would have increased the clearances to a serious extent, and the weight of the double-ported marine valve put its adoption out of the question. The Allen valve was satisfactory for admission, but quick exhaust was of more importance.

The advantages gained by a negative exhaust lap showed that a double exhaust port during the first part of the exhaust period would be of equal value as if it were double through-

out, because at the time the crank passes the center the main exhaust is more than ample, since it at that moment largely exceeds the exhaust nozzle in size, and is then rapidly increasing. By taking advantage of these conditions it was found that the auxiliary port in the Allen valve could be so arranged that it would serve the double purpose of both admission and exhaust port. The application of this valve proved a decided advantage both in speed and hauling capacity at speeds of 15 miles per hour and upward, the gain increasing with the increase of speed over the plain valve to the remarkable extent shown in the figures given below. Gain of 5 per cent. at 15 miles per hour, 14 per cent. at 22½, 27 per cent. at 30, about 44 per cent. at 37½ miles per hour. With these improvements all real objections were removed.

The cylinder sizes of the earlier compounds were designed so as not to give the margin of reserve power which up to that time was to be had with the simple engine. The fact that the compound could in emergency be worked simple gave an excess of power that was ample. This worked well for the first few years, but as the tendency to increase of load encroached upon what had been the simple engine's reserve of power the compound had to be worked as a simple engine to an extent that was detrimental to its economy, in order to keep up in hauling capacity with the now greater taxed simple engine. The reputation of the compound therefore declined. Larger cylinders and higher boiler pressure could be given to new engines, but that would not help the somewhat discredited compounds on the road. Some fear was at first felt of over-cylindering the engine when working simple, but it was discovered that 33 per cent. of the weight on the driver could be utilized for tractive power, when so working without slipping. This removed all hesitation as to making cylinders of such a size that 24 per cent. of the weight on the drivers could be utilized for tractive power when working compound, or equivalent to that of the simple engine and 30 per cent. (= 25 per cent. increase) in emergency when working simple. The increase in load in recent years has practically deprived the simple engine of all spare power, so that in starting a train it has very frequently to take the "slack" of the cars with corresponding detriment to the draw gear. The compound in starting is less hard on rolling stock, as its starting power is from 20 to 25 per cent. greater than its normal hauling power. The repair item has fluctuated somewhat in comparison with the simple engine. Where in excess it has generally been owing to some reason outside and apart from the compound principle. The milder draft on the fire means fewer sparks thrown, and a reduction of the chance of setting fire to property along the road by from 60 to 70 per cent., and this is held to more than warrant the replacing of simple engines by compounds.

Mr. Mellin says that the balancing of the slide valves on a compound does not present so serious a problem as on a simple engine, as the receiver pressure counteracts the load on the high-pressure valve. He also says a few words about the size of boilers and fire-boxes, and concludes with eleven reasons in favor of the compound.

Tandem Compound Locomotive for the Russian State Railways

Le Genie Civil, Dec. 8, 1900, p. 85.

This engine is intended to haul express trains of 250 tons weight between St. Petersburg and Varsovia at an average speed of 46 miles an hour and up 0.8 per cent. grades at a speed of 31 miles per hour. The engine is carried on eight wheels, of which four are coupled, with a four-wheeled bogie truck in front. They have four cylinders set in pairs, tandem and outside the frames. The smoke-box contains, in addition to the exhaust pipe, a large perforated plate for a spark arrester as well as a number of pipes and accessories, which render the cleaning and repairing of the tubes somewhat difficult. A hopper chute, closed by a slide, makes it possible to remove cinders from the front end. There is also a sprinkling pipe for extinguishing sparks in case of necessity.

The high-pressure cylinders are in front of the low, and the ratio of volumes of the two is as 1 to 2.25. The clearance spaces are 8 and 6½ per cent., respectively, of the small and large cylinders. They are connected by a heavy casting that is integral with the low-pressure cylinder head. This piece is so cored out that easy access is afforded to the stuffing box glands of the piston rods. In order to facilitate starting, it is possible, by means of a special cock, to introduce live steam directly into the low-pressure cylinder.

The tandem arrangement of cylinders, while subject to criticism from some points of view, for high-speed locomotives, does, nevertheless, possess the advantage of requiring but one system of rods and connections on each side. The steam chests are placed above the cylinders, and are very large, and contain piston valves. The steam distribution is effected in such a way that that exhausted from the front end of the high-pressure cylinder goes, after having passed through the receiver, into the back end of the low-pressure cylinder, while the steam exhausted from the back end of the high-pressure enters the front end of the low. The action of this engine is, therefore, similar to that of a Woolf machine; but, in other respects, in that it has an intermediate receiver, it can be classed as a true compound locomotive. The valves on each side are driven by a single stem, inclined like the cylinders, and driven by the Walschaert motion, giving a constant lead of .35 in. for all points of cut-off. The latest point of cut-off is at 75 per cent. of the stroke. The reversing mechanism is no more complicated than that of a two-cylinder locomotive, and is operated as usual.

The Danger of the Lap Joint

Railroad Gazette, Jan. 4, 1901, p. 10.

The explosion of a boiler in the Chicago power house of the Chicago & Northwestern Railroad, which happened on Dec. 3, 1900, is the subject of editorial comment. The boiler which failed was a cylindrical stationary one with horizontal lap joints. The analysis of the plates of the boiler which failed are said to show high phosphorus, but in the nature of things it would seem to be merely a matter of time for lap joint boilers to crack near the horizontal seams, and in a place where a defect is difficult to find. One of the largest boiler insurance companies says that about 90 per cent. of the explosions of cylindrical boilers coming under its notice are caused by sheets cracking near the horizontal lap joints, as in the case of the Chicago & Northwestern boiler. These boilers are constantly giving way at the lap in spite of the closest inspection.

The lap joint has been abandoned in locomotives, as it is regarded a dangerous form of construction, and its retention in stationary boilers is probably owing to its cheapness. In making the lap the edges of the plates are usually hammered over, which no doubt weakens the material at the most vital point, and the lap joint when made, throws the shell out or round, and this produces an injurious tendency to change its shape under change of pressure. The stiff section at the joint concentrates the strains so set up a little beyond the line of rivets, and just about where the plates have been most distorted in bending. It is plain to see that stresses set up in this way near the joint may easily start a crack under the lap which cannot be detected until it extends through to the inner surface of the shell. The conditions are worse if the rivet holes have been punched and if the workmanship is poor.

Recent Boiler Explosions

National Engineer, Jan. 1, 1901, p. 1.

Mr. F. J. Manney, special correspondent of the National Engineer, says the past month (December, 1900) has been prolific in boiler explosions; two are mentioned. The first was that which occurred at the Glucose Sugar Refining Company's plant at Davenport, Iowa. The boiler that exploded was the end one of a battery of 18. It was a plain tubular, 72-in. boiler, 18 ft. long, with 60 tubes, 4 in. in diameter. It was made of ⅜-in. steel plates, 60,000 lbs. tensile strength. It had ⅝-in. heads. All longitudinal seams were double-riveted with ¾-in. rivets, 2¼-in. pitch, the girth seams being single-riveted with 2-in. pitch. The facilities for cleaning were good, and the boiler was found to have been clear of scale. The staying appears to have been adequate, and altogether the boiler seems to have had the best of care taken of it. The explosion occurred at

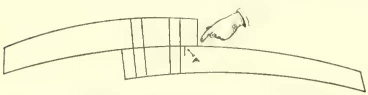
9 p. m., when everything appears to have been as usual. The watch had just been changed, and there is ample evidence leading to the conclusion that there could not have been excess of pressure or shortage of water. The boiler had no dome, but the battery was connected by 6-in. branch pipes to a 14-in. main. Each boiler had a 4½-in. spring safety valve, and it is hardly possible for the whole 18 safety valves to have been inoperative at the same time. An account of the wreck occasioned by the explosion is given in some detail. The writer dealing with the point of vital interest, the cause, says: "The rupture occurred in the middle sheet of the boiler and showed a clean tear from rivet hole to rivet hole, clear across the sheet in the second row of holes which was under the lap. The most plausible solution of the cause seems to be that in rolling the sheets after the holes had been punched the sheet became crimped in the rolls, causing a slight skin fracture from hole to hole across the sheet, or the rolls failed to make a perfect curve on the end of the sheet. In either case the expansion and contraction would work on the sheet in such a way as to cause an initial fracture, no matter how slight, to deepen until it reached a point where the remaining part of the sheet just balanced the pressure, when any sudden jar would result in tearing them apart."

The second explosion spoken of was that in the power house of the Chicago & Northwestern Railroad, which occurred at 5 p. m., Dec. 3, 1900. The casualty list of this disaster has been increased in subsequent reports, 17 persons having been injured and nine deaths having occurred. The details of the wrecking of the power house, which is situated on Kinzie street, Chicago, together with an account of the casualties, are given, but the exact cause of the explosion has not yet been determined. A thorough and searching investigation is being made.

The C. & N. W. R. R. Boiler Explosion

Modern Machinery, January, 1901, p. 30.

After describing this accident which occurred in the railroad company's power house, Kinzie street, Chicago, and giving details of the loss of life and the wreck of boilers and building, Modern Machinery refers to the cause of failure. The boilers were made of ⅜ in. plate Lukens flange steel, having a tensile strength of 55,000 lbs. They were of the ordinary horizontal type, 18 ft. long, 5 ft. in diameter, with dome on top of center sheet. The longitudinal seams were double riveted lap joints, ¾ in. rivets, standard spacing, and these seams were out of the fire at an angle of 45 degs. above the center line. The safety valves were set at 90 lbs. pressure. The boilers and everything pertaining thereto were inspected and tested by the Hartford Steam Boiler Inspection and Insurance Company in August last, at which time they found everything to be in good condition. In June, when the inspection was made, it was found that the boiler had a factor of safety with 90 lbs. pressure of 4½. On close inspection of the boiler immediately after the explosion, it was discovered that the boiler gave way at the seam, immediately under the lap, as the illus-



NORTHWESTERN BOILER EXPLOSION. SKETCH SHOWING POINT OF WEAKNESS IN BOILER.

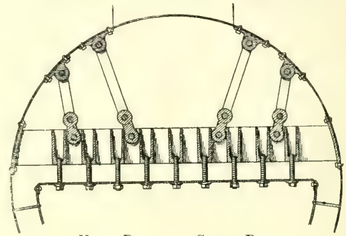
tration will show. The break started at the check mark that is indicated by the letter "A," and started downward from the top of the sheet to the inside of the sheet. This started a distance of 12 rivets from the end of the sheet, which was the rear sheet in the boiler, and tore out in both directions front and back from the place it gave way, straightening that sheet out on either side, and throwing the forward part of the boiler directly across the boiler room over the top of the two south boilers, through the building out onto the railroad track. It will be seen by this that this boiler gave way, as is customary with this type of boiler when they go. It gave way outside of the point of rigidity; in other words, where the rivets hold the sheets firmly together, and whatever vibration or motion there is would be centralized immediately outside of the rivet at the point where the fracture occurred, and on account of this fracture being covered by the lap, it could not be seen by any inspection that could be made, unless the boiler was cut apart to do so.

The article concludes with some remarks on the manner of conducting the city inspection bureau.

Novel Form of Crown Bar

Railway and Engineering Review, Dec. 29, 1900, p. 733.

A novel form of crown bar suggested by Mr. E. Clay, of Wadsworth, Nev., is illustrated. The object of this device is to do away with a part of the mass of material, incident to the use of crown bars, bolts and washers, which form an impediment in the way of free circulation of the water. With freer circulation there is less chance for the deposition of encrusting matter. A cast-steel crown bar is made in the form of side plates and connecting ribs, but without the usual toes at the ends of the bars. The ends spread out into curved flanges which fit the shell to which they are riveted. The crown bar bolts pass up through the crown sheet and are screwed into the transverse ribs which connect the side plates. The bars are further supported by sling stays from the roof sheet.



NOVEL DESIGN OF CROWN BAR.

The Review commends the endeavor to obtain freer circulation, but doubts the wisdom of abandoning the washers, and of depending simply upon the thread in the bars, as the absence of the head very materially reduces the allowable stress which may be applied to the bolt. The writer of the article suggests some alterations in the device; he thinks the bracing would be much more firm if small sections of piping, which would not materially obstruct the circulation, were introduced between crown sheet and bars, through which the bolt would pass. He is also of opinion that incrustation would probably very soon prevent the bolt from being withdrawn by simply unscrewing, and therefore the advantage of doing without a head is only temporary. He suggests that a headed bolt be dropped from above into a suitably shaped opening in the transverse ribs between the bars, which would prevent the bolt from turning. The bolt passing through the interposed pipe below the bar, through the crown sheet, could be drawn tight in the fire-box by screwing up a nut, and finished by beading over the bolt. To remove such a bolt it would only be necessary to remove the nut and knock the bolt up through the sheet and bar.

A Broad View of Locomotive Design

American Engineer, January, 1901, p. 11.

This article is a general summary of Mr. Waldo H. Marshall's address on the subject of locomotive design delivered to the students of Purdue University. On the question of how heavy shall the engine be, the author says: "Unless the physical condition of the road establishes other limits, I would say as a general proposition that the road should not only build the largest engines that can be used advantageously today, but, if possible, should meet the conditions that would prevail in the future, say, five or ten years from to-day."

Mr. Marshall, while giving a high place to Atlantic type designs, believes that the limited amount of weight on the driving wheels will eventually lead to its being superseded for the heaviest passenger service. For this work, he thinks, three pairs of driving wheels are required. The question of why

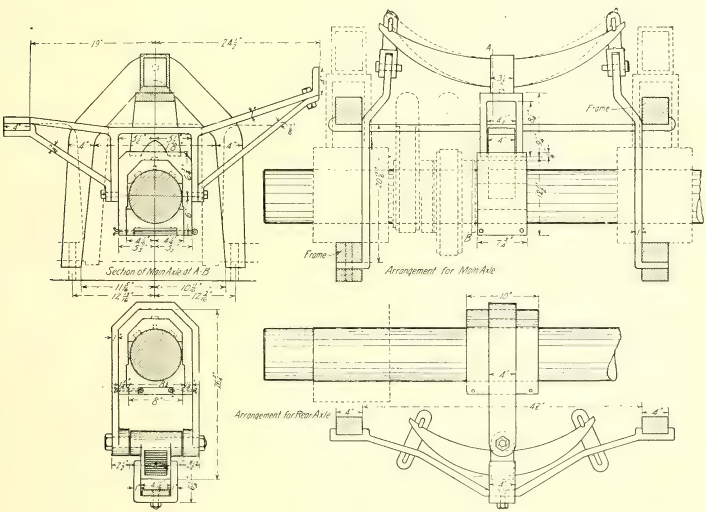
so much tractive weight is required when it can only be fully used in starting trains—at high speeds the mean pressure of the pistons is too small to utilize it to the utmost—Mr. Marshall holds that without it engines cannot start trains of from 12 to 15 cars without taking the slack, and if the rail be slippery, the weight on the drivers is, for the first quarter of a mile, insufficient to utilize the full cylinder pressure. Both of these conditions cause loss of time.

The difficulty of getting a wide fire-box over driving wheels of, say, 72 in. diameter or more, stands in the way of accepting the otherwise suitable 10-wheel design for heavy fast passenger trains.

Middle Bearing on Driving Axles

Railway and Engineering Review, Jan. 19, 1901, p. 34.

A middle bearing has been devised by Mr. George W. West, superintendent of motive power of the New York, Ontario & Western R. R., for four heavy mogul engines on that line. The idea is to relieve the boxes at the sides of some of the weight which they would otherwise have to carry, and so do much to obviate the evil arising from heavy weights carried per square inch of journal bearing. The method adopted in applying a middle bearing at the main axle necessarily differs from that employed in the case of the rear driver. In the illustration Figs. 1 and 2 show middle box as applied to the main axle, while Figs. 3 and 4 show that on the trailer. Since these boxes are only weight carriers, they are supplied with brasses very similar to the usual engine truck brass. The brasses are 7¾ in. long, and rest on 8-in. journals. A frame with half pedestal jaw to keep the box in place passes under the saddle, and is bolted to a couple of cross frame braces. The usual cellar arrangement is used. The rear box is semi-hexagonal on top, from which a hanger of 1 x 4 in. section is suspended. The other details of attachment are to be seen in the diagram. These middle bearings, it is stated, have now been in service on a locomotive for several months with very satisfactory results.



Locomotive Classification

American Engineer and Railroad Journal, January, 1901, p. 21.

Mr. J. Snowden Bell writes in praise of Mr. Whyte's scheme of locomotive classification, and calls attention to the misuse of the names which we now have, both in the technical and non-technical press. He points out that many people wrongly substitute the word "consolidated" for the correct word "consolidation" in speaking of the 2—8—0 engine of Mr. Whyte's scheme. He says that this type "has no feature, either structural or operative, to which the word 'consolidated' would be applicable in any sense." The type took its name from the first engine built with this disposition of wheels. This engine was called the "Consolidation." He also refers to the use of the word "mogul," which has been wrongly applied to ten-wheelers.

Mr. G. S. Edmonds, mechanical engineer, Delaware & Hudson Co., proposes a modification of Mr. Whyte's scheme for locomotive classification. The proposed plan gives two pieces of information, over and above the indication of the wheel disposition of the engine. The form chosen by Mr. Edmonds is that of a fraction in which the numerator gives the wheel disposition of the engine, and the denominator that of the tender. The numerator can be made to indicate inside or outside connected drivers, and whether inside or outside journals are used on the trailing wheels by the simple use of the plus or minus sign, plus indicating outside, and minus, inside. Thus an engine with an ordinary four-wheeled truck, with single drivers, inside connected, and a pair of trailing wheels having inside journals and a six-wheeled tender, would be represented as $\frac{4-2-2}{6}$ The "Atlantic" type engine with outside connected drivers and outside journal bearings on its trailing wheels, together with the regulation tender, would under this system be $\frac{4+4+2}{4,\ 4,}$ and so on throughout the entire series of types.

New "Empire State Express" Locomotive

American Engineer and Railroad Journal, January, 1901, p. 8.

Mr. A. M. Waitt, superintendent of motive power and rolling stock, N. Y. C. & H. R., has recently designed an engine for the famous express trains of that road. The engine is of the well-known American type and is similar to those formerly built by Mr. Buchanan. The frames have been strengthened and the boiler has been enlarged with same sized cylinders and drivers as before. The boiler is 65 in. diameter, has a sloping back head and radial staying, the heating surface being 2,404 sq. ft. The heating surface in the earlier engines was 1,900 sq. ft. The total weight is 164,400 lbs., weight on drivers 94,400 lbs. The tender weighs 108,000 lbs. The boiler, cylinders, frames and tenders were built at the Schenectady Locomotive Works, and the rest of the work was done at the company's shops at Depew. Mr. Waitt uses the alligator cross-head on these engines instead of the four-bar guide. He is said to have improved the engine in many ways without making any radical changes on Mr. Buchanan's design.

The Indicator and Exhaust Nozzle

Locomotive Firemen's Magazine, January, 1901, p. 35.

This article, taken from the report of a committee of the Traveling Engineers' Association, shows the effect of a bridge of triangular section when placed across the exhaust nozzle of a locomotive. The bridge used was ¾ in. on a side, and was placed with apex downward. The introduction of such a bridge would be equal to the reduction of a 5½-in. single nozzle down to a 5-in. one. Two indicator cards were taken, one with bridge out and one in. The engine having been arranged to effect this change from the cab, only a very short interval of time elapsed between the cards. The outline of both cards coincided except where the pencil traced the back pressure and compression lines. With the bridge in, the back pressure and compression were higher. Both cards were taken from one and the same end of the cylinder only, but the figures for horse-power, represent the total horse-power developed by the engine under the two conditions. The results are tabulated as follows:

	Open nozzle.	Bridged nozzle.	Difference.
M. E. P. in lbs.	62.8	56.0	6.8
Area of card in square inches	3.50	3.19	0.31
I. H. P.	932.80	825.74	107.0

The introduction of the bridge reduced the total horse-power 11.3 per cent. By the use of the formula given in part iii of the report it may be shown that an engine such as the one under test has a tractive power of 136 lbs. for every pound of mean effective pressure in the cylinder. Without the bridge the drawbar pull was 8,541 lbs., and with the bridge it was 7,616 lbs. The most reliable train resistance formula gives at a speed of 41 miles per hour—which was the speed in this test—12.25 lbs. per ton on a straight level track. The difference between the capacity of this engine at this speed for handling train with bridge in, and with bridge out, shows that the introduction of the bridge reduced it about 75.51 tons, which is equivalent to about 1½ Pullman sleepers. The article concludes with these words: "What has been said concerning the bridging of nozzles will apply equally well to small nozzles unbridged. Your committee appreciates the fact that there is a limit to the size of nozzles governed by the quality of the fuel, etc., beyond which you cannot go. We are not making a stand against necessary small nozzles, but against carelessly small ones."

Thuile High Speed Locomotive

Le Genie Civil, Nov. 19, 1900, p. 37.

This engine is of a decidedly special type. It is carried on 14 wheels, of which four are coupled and set between a four-wheeled bogie in front and a six-wheeled one at the rear. It is driven by two simple expansion cylinders, and has a motor by which the entire train is lighted electrically. One of its most prominent features is the position occupied by the engineer, which is in a cab at the extreme front. This cab is wedge-shaped, so as to lessen the wind resistances. The fireman is located, as usual, at the rear. The boiler is built to sustain a pressure of 206 lbs. per square inch, which is somewhat high for a simple expansion machine, on account of the thermal losses and cylinder condensation due to wide variations of temperature. The fire-box is of the Belpaire type with flexible stays in the two front rows supporting the crown-sheet. The piston valves are placed above the cylinders, and are almost perfectly balanced. In order to lessen, to some extent, the condensation to which live steam would be subjected when in contact with walls, along the other side of which exhaust steam is flowing, the admission and exhaust passage have been separated, and the steam is admitted at the center of the valve and exhausted at the ends.

Again, in order that, while running with the throttle closed, there may be no admission of smoke-box gases into the cylinders, a mechanism attached to the throttle lever is so arranged that a valve closing the admission of gases to the cylinders can be shut at the same time as the throttle valve.

A cab has been placed at the rear for the accommodation of two firemen. A Laval turbine is used to drive a dynamo for lighting the train. Although separated from the firemen, means of communication are furnished the engineer by a horn and a bell. The tender is carried on two bogie trucks: one, that in front, having four wheels and the other six.

A Locomotive Museum.

American Engineer and Railroad Journal, January, 1901, p. 7.

The nucleus of a locomotive museum is being formed at the Purdue University. Certain classes of locomotives which have long done service are gradually giving way to newer designs. It is thought desirable to secure specimens of such locomotives. The university asks that roads having engines which for any reason are distinctive, consider the advisability of preserving a sample at Purdue. It is expected that only engines which are put out of service shall be sent to that institution, instead of being scrapped. The authorities of Purdue do not look for any transfer of ownership; they are willing to meet transfer charges, to house and care for engines, and to hold them subject to the order of the owner. It will be more or less a loan collection. An engine to be desirable should be distinctively different from others in the collection. At present three engines have been secured. One, the gift of a Western road, is of the American type, as built 30 years ago, first used in transcontinental service. The second represents the "camel back" type, and comes through the courtesy of the B. & O., upon whose line it ran for many years. The third is the English engine "James Tolman," exhibited at the Columbian Exhibition in 1893, which has since been in the hands of the C., M. & St. P. Ry.

Car Equipment, Appliances and Related Matters

The Large Steel Car

American Engineer and Railroad Journal, January, 1901, p. 1.

Mr. W. S. Morris, superintendent of motive power of the Chesapeake & Ohio Railway, contributes an interesting article on the large steel car. He gives some interesting details of the evolution of the wooden car, from the 7,000 lbs. four-wheeled "goods wagon" up to the present time. Coal cars in 1860 carried five tons, and merchandise cars carried about the same weight. In 1865 an ordinary load for a box car was 15,000 lbs. The writer refers to his own experience as an apprentice in 1874 working on new box cars weighing 19,000 lbs., and with a carrying capacity of 14 tons. The 21-ton car appeared in 1876, the 25-ton car in 1883, the 30-ton car in 1885, and the 40-ton car in 1895. The present day sees the 50-ton steel car in use carrying 10 per cent. above its marked capacity. There follows a brief enumeration of the patents issued to people in this country for metal cars. In 1890 Mr. C. T. Schoen took out his first patent conjointly with Mr. J. M. Hansen for "a car with steel frame and vertical plates riveted to the same and strengthened by means of rolled metal." The "Schoen" car is the only steel car that has been used extensively both in its gondola and hopper form. Combination

wood and metal cars, Mr. Morris says, are to-day offered by some constructors in a conservative way. The probable life of the steel car is still a debatable point, but it is reasonably estimated to be within economic limits, but its ability to carry paying loads of the roughest freight with minimum tare, and to withstand a good deal of downright abuse in yards is admitted by all. The gradual introduction of steel cars at a time when wooden cars are still in use, and the growing familiarity of woodworkers with steel used for purposes hitherto reserved for wood will not bring about any violent change in either the personnel, the shop practice or the plant required to deal with steel car repairs. The writer points out the latest production of wooden car for heavy carrying capacity; the "Canda," 100,000 lbs. box and coal car. He is of opinion that effort has been made to get the very best material in order to promote strength and reduce sizes, so as to keep down dead weight. The "Canda" is a credit to its designer, and appeals to him as an ideal of wood construction, but he says "it does indicate a positive limit to which careful engineering can go," while the steel car is limited only by the bridges and road upon which it may be used.

Mr. Morris quotes some interesting figures from the president of a road which uses steel cars extensively. The president referred to presents a large amount of data, and among other things says, in effect, we find from tests, approximately, that if 1,500 tons of freight be placed in wooden 60,000 lbs. capacity cars, and if the same load be placed in steel cars the dead weight of the wooden car train would be 62 tons more than that of the steel. It would take 47 such wooden cars, and only 30 steel hoppers to carry the freight. The great saving in train mileage, track room wear and tear, switching, oil and repairs, is thus demonstrated. The article concludes with a statement of the advantages gained by reducing the length of trains for a given tonnage which may be done by the use of large capacity cars. This may be briefly summarized as follows: First, atmospheric friction is lessened, and the moving load being closer to the engine can be more easily handled. Second, less cars and locomotives required to move a given tonnage, saves interest on capital and car service, and reduces the returning empties. Third, increase in the capacity of main line yards and shops is avoided, and switching is reduced. Fourth, a large saving in wages is effected by reason of a reduction in the number of trains required.

Center Plates

American Engineer and Railroad Journal, January, 1901, p. 6.

This article, by Mr. Edward Grafstrom, Mech. Engr., A. T. & S. F. R. R., begins by pointing out that the increasing weight of cars and the heavier service to which they are subjected at the present time has led to the abandonment of cast iron for the material of center plates. He takes exception to the report of the committee of the M. C. B. Association on center plates in the matter of dimensions. The committee appears to have assumed that 400 lbs. to the square inch of bearing surface should be the figure used in determining dimensions. Mr. Grafstrom holds that this pressure is insignificant as far as crushing the metal of the center plate is concerned, and as for wear he quotes the committee's own observations, from which it was found that the movement of the center plates on an 18 deg. curve was imperceptible. Friction, he says, did not form a basis for determining the pressure per square inch, as the committee gives as its reason for recommending large bearing surface that "the friction is as the weight to the number of inches on which it is distributed." It is pointed out also that the Committee on Side Bearings recommended that 800 lbs. be taken. The Committee on Center Plates used a plate having 1,405 lbs. pressure on it with very fair results. From these facts Mr. Grafstrom concludes that within reasonable limits the pressure has nothing to do with the size of the plates. The advantage of carrying the load on the center plates is shown by the Committee on Side Bearings. Pursuing his line of reasoning, he says: "If the center plates are sufficiently large, for the resultant of the weight and the centrifugal force on curves to fall within the contact surfaces, all reasonable demands ought to be met."

In order to determine the angular deflection of the line of strain resulting from the combined forces which act on a car on a curve, the writer takes the case of a box car moving at the rate of 50 miles per hour on a curve, the latter having the outer rail elevated at an angle of 3 deg. These conditions he takes as fairly representative. The car body is assumed to weigh 21,000 lbs., and the lading 66,000 lbs. This makes a total of 87,000 lbs., and brings the center of gravity 5.88 ft. above the rail. The centrifugal force of the car under these conditions of track and speed will be 14,517 lbs. By means of a short mathematical calculation he arrives at the diameter of the contact surfaces of the center plates, and this he finds to be 9½ in. A design of center plate by the writer based on this calculation is shown, the bearing surface being 9½ in. and the outside width 12½ in. in diameter. The actual bearing surface is 50 sq. in., and the approximate static pressure 870 lbs. per square inch. The fillets of these plates are made on the same principle as those of wheel flange and rail head, so that if the car be jolted to one side there will be no tendency to climb.

The cup or ball-shaped center plate is condemned by the committee, and Mr. Grafstrom further points out that with these plates the friction increases as the radius of curvature of the bearing surfaces decreases, if the outside diameter remains the same, just as a plug valve is turned with greater difficulty, the less taper it has.

The Iniquitous Line Car

Railway and Locomotive Engineering, January, 1901, p. 18.

Railway and Locomotive Engineering, in its January issue, calls editorial attention to a paper read at the October meeting of the Northwest Railway Club, by Mr. G. P. Zachritz, on "Repairs to Private Line Cars." It says it is strange that railroad companies allow themselves to be imposed upon by the private lines, and it states one fact in the situation very succinctly when it says: "If fewer railroad officers were stockholders in line car companies, it would be much better for railroad companies." Money is undoubtedly lost by railways in repairing such cars. Railways having private line cars in their yards make repairs, using parts standard to these cars as far as they know, there being so many standards, it is impossible for the railways to always make correct repairs. When a car, so repaired, gets home, the owners procure a joint evidence card for wrong repairs, and bill the railroad. A case showing the extent to which this practice is carried is cited, in which a claim was made by a private line for wrong repairs for a brass which had been applied early in May, the proper repairs having been made in October. Nearly seven months' good service of the so-called "wrong brass" was had by the private line before it called upon the railway company to pay for the journal bearing which it had run so long without protest. No one appears to be at any time responsible for the private line car. Such a car delivered to a connecting road with missing material—chargeable to the delivering road—is not carded for these defects by the delivery road. "Nobody seems willing to take the responsibility." The great reluctance on the part of the private line people to inspect a car prior to its being loaded is pointed out, and it is stated that private line cars ready to be handed to railway companies are seldom in condition to go over the receiving road without repairs being made. In such a case the private line car people disclaim all responsibility, and when technically wrong repairs are made to accommodate the owner, owing to the railway being short of private line material, the company so accommodating the owner is later called upon to pay for the wrong work done, by which the freight was forwarded. The editorial writer remarks in conclusion: "All of this goes to show that private line car companies employ officials who deliberately combine to cheat railroad companies."

Car Journal Bearings and Hot Boxes.

Mr. S. P. Bush, before the Western Railway Club, Chicago, December, 1900, p. 226.

The writer of this paper proposes a form of journal bearing which he thinks will have a tendency to reduce the number of "hot boxes," due to new brasses being applied to worn journals. When a brass suitable for a 4¼-in. journal is applied to one worn down to 4 in. diameter the result is that the initial area which carries the load is of course the full length of the

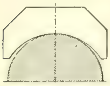


Fig. 1.—Outline of New M. C. B. Brass and Worn Journal.

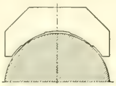


Fig. 2.—Outline of Mr. Bush's Modified Brass With New Journal.

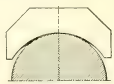


Fig. 3.—Outline of Mr. Bush's Modified Brass With Worn Journal.

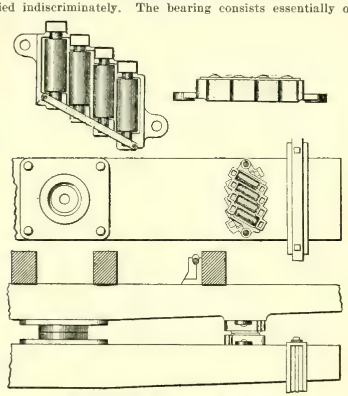
journal, but it is exceedingly narrow and before full adjustment can take place the journal has become heated. Mr. Bush, therefore, proposed to make a brass which would provide two lines of contact instead of one. It is thus described: "The inner surface of the bearing is provided with a raised strip on either side of the center line and parallel with it. These strips are from ⅝ to ¾ in. wide and are directly under the edges of the horizontal surfaces of the key and bearing so that there is little tendency to spread the brass. They are raised above the inner surface enough only to provide these lines of contact between the bearing and journal when the latter is worn to 3¾ in." Two lines of contact are also secured when the journal is full sized, and a better and more speedy adjustment of brass to journal takes place. A further advantage claimed is that with new brass and worn journal, the movement of journal caused by an application of brakes or in passing round curves is restricted much more than with the usual form of brass. The result of the better adjustment secured by the two bearing areas is that the tendency of box to go down as the brass wears, and the consequent dropping away of the packing from the under side of journal will be reduced, and so the opportunities for hot boxes will be lessened. The plan propôsed by Mr. Bush is shown in the illustrations.

Roller Side Bearings

Railway and Engineering Review, Dec. 29, 1900, p. 733.

Mr. Russell Harding, vice-president and general manager, Missouri Pacific Railway, has devised a roller side bearing embodying some new features, which is being given a trial on that line, and which we illustrate herewith.

The upper and lower bearings are the same and may be applied indiscriminately. The bearing consists essentially of a



Roller Side Bearing, M. P. Ry.

casing in which are laid four cylindrical rollers, parallel with each other but situated en echelon, so that their axes lie at an angle with the lineal dimensions of the bolster. Accordingly, the two sets of rollers above and below will lie at an angle to each other, which allows the rollers to pass smoothly over one another and at the same time tends to prevent the rollers from becoming flattened as quickly as if they bore upon its flat surface. The rollers are retained in their casing by means of a strip which is shown in the upper left detail and by means of which the rollers may readily be exchanged in case of wear or breakage.

Electric Equipment, Machinery and Appliances

Machine Driving by Separate Motors

Engineering Times (London), January, 1901, p. 467.

The application of electric motors to the driving of individual machines is rapidly advancing in favor by reason of the economical advantage it offers. Driving machines by shafting and belt necessitates the sinking of a certain amount of capital in the building itself, in order to make it strong and rigid. The shafting and belting are unsightly, and are a source of danger, and outside of the money it takes to keep it all in repair, it consumes a great deal of power. It is estimated that the loss in the transmission of power from this source is as much as from 35 to 40 per cent., and it has been known to reach 70 per cent. of the power given off by the engine. In electric power distribution the loss may safely be stated as not exceeding 25 per cent., which is a saving of from 10 to 15 per cent. When fuel is high in price these figures represent a very substantial saving in money. Another economy of which the motor is capable is that when it is desired to run only one or two machines for any purpose, the loss of power uselessly absorbed in the revolving shafting is avoided. The motor only runs when the machine is in use, which is another form of the same economy.

Our German and American competitors, especially the former, particularly appreciate this point. At the Paris Exhibition were to be seen many tools with motors built into them, and others with motors simply attached. The former method is most commendable. The machine tool works of Messrs. Kendall & Gent and the printing works of Sir Joseph Causton are operated with electric motors.

The attachment of motors to machines may be done, broadly speaking, in two ways, viz., by direct connection and by gearing.

In printing offices, book-binding works, or where there are machines which require very little power to drive them, it has been found economical to group them and drive from a shaft revolved by a motor. Emery wheels and tool-grinding machines can be driven in this way.

The remainder of the article is devoted to a description of various motors and the methods of attachment. A number of fine half-tone illustrations are given. A view, and a section of the bi-polar motor "Lundell," together with a description, are given. This motor, which is said to be used extensively in the United States, is made by Messrs. J. H. Holmes & Co., of Newcastle-upon-Tyne.

Electric Express Railways

Tramway and Railway World (London), Dec. 6, 1900, p. 602.

"Electrical engineers and all interested in the development of high speed running will be glad to see that the scheme of the Manchester and Liverpool electric express railway, which failed to get through the Parliamentary ordeal last session, is to be introduced again. We believe that many, if not all, of the most serious objections which were raised to the bill have been met by the promoters. An advance has been made in the matter of brake power, and it will probably be found that in many respects the opposition of certain local authorities has been met. It is not merely for the benefit of Manchester and Liverpool alone that we desire to see the scheme sanctioned and carried out, for if it is a success mechanically and electrically—and of this many experts have no doubt—it will be the forerunner of other lines which will revolutionize express traveling between the great centers of population."

Electric Trains on German Steam Railroads

Electrical Review, Jan. 19, 1901, p. 112.

Cable despatches from Berlin say that Kaiser Wilhelm believes the proper motive power for fast trains on German railroads to be electricity, while steam is considered only efficient enough for freight and shunt work in the yards or for local accommodation traffic.

The Emperor has displayed much interest in the recent experiments in heavy electric traction between Berlin and Zehlendorf, where good results were obtained. Under his patronage an experimental line 30 kilometers (18.63 miles) long will be maintained between Berlin and Zassen, single-car trains of 50-passenger capacity being scheduled for half-hourly trips at a high speed. This line is the military system, and is placed at the disposal of the syndicate which will conduct the experiments by order of General von Goessler, Minister of War. The cars look like ordinary European sleepers, and it is hoped to attain with them a speed of perhaps 200 (124.2 miles) to 250 (155.25 miles) kilometers per hour.

Electricity for the Metropolitan District Railway

Transport (London), Jan. 11, 1901, p. 33.

How to raise funds for the purpose of changing the District (underground) Railway in London from steam to electric traction was explained by Mr. J. S. Forbes recently to the shareholders of the company. The board has two alternative proposals. The scheme which at present holds the field is to raise £500,000 of the share capital authorized by the company's 1897 act, together with the usual one-third debentures £166,000 for the purpose of carrying out the electrical conversion scheme sanctioned last year by Parliament. The directors have, with the consent of the meeting, taken power to issue this new stock in such manner as they think advantageous to the company. The board hopes to be able to make a bargain with one of the large electrical combinations who have tendered for the work. Mr. Forbes avoided details, but appeared to have good grounds for confidence that what he described as "a lump sum contract" could be arranged on these terms. He did not give any information as to how much of the system was to be electrified at first; what is proposed to be done with through traffic for other companies, or whether the present traffic could be carried on efficiently during the process of conversion. He was not pressed for information on these important points.

Those present seemed to have come to the meeting under the impression that the board wanted them, then and there, to agree to a reduction of the rate of dividend accruing on the preference stock. Mr. Forbes showed that this was an alternative scheme for which the board was seeking Parliamentary powers only in case the hoped-for arrangement with the electrical combination did not come off.

Conducting Transportation

The Use of Snow Ploughs and Flangers

Engineering News, Jan. 31, 1901, p. 84.

With the approach of winter railways in snowfall regions are expected to make preparations for keeping the line open. Snow sheds are now rarely employed and some of those on the Intercolonial Ry. of Canada have been removed and snow fences substituted. With reference to snow plows and the method of preparing rolling stock, methods vary in different parts of the country. On the C., B. & Q. strips of wood are nailed between the pilot slats, while some branch lines are equipped with small sheet iron pilot plows. On a few divisions of the road large engine plows are used, being attached to the locomotive and extending above the boiler.

On the C., M. & St. P. in the Michigan peninsula, and in the extreme northern part of Wisconsin, it is the practice to use for ordinary storms, pilot snow plows and flangers attached direct to engines; however, the work of plowing snow is done with the independent plow and independent flanger. In the latter case the large engine snow plow reaching well up above the top of the boiler is used. The flanger is attached to a car. This road has also two rotary plows, located at Minnesota. The Great Northern, which passes through a region of heavy snowfall, does not use pilot plows on engines. A few flanging cars are used, and a large number of iron engine plows which are fastened to the buffer-beam, the pilot having been removed. This road also has some rotary plows. In order to keep the snow well back from the track "snow dosers" or cars with large wings are employed.

The Wisconsin Central Ry. equips all its passenger engines and about 25 per cent. of its freight engines with pilot plows. In addition, one engine for each district is equipped with a large plow covering the front end. Such engines are held for an emergency. This road also uses the Temple flanger hinged to forward end of pilot and operated by means of compressed air.

Telephone Train Despatching

Railroad Gazette, Jan. 4, 1901, p. 9.

This article, by G. F. J., explains the substitution of the telephone for the telegraph for the purpose of despatching trains on several lines of railway. One reason alleged for the non-adoption of the telephone for this service is the fact that all railroads are equipped with telegraph lines, the influence of the great band of telegraphers, the economical objections and the mechanical difficulties to be overcome. There is no mechanical superiority in the telegraph over the modern telephone equipment. In fact, the telephone possesses some advantages over the telegraph, one of them being that it will work under circumstances which make the telegraph inoperative. With the telephone installed for despatching, the same accuracy is secured as with the telegraph by having the train order in all cases repeated back to the despatcher before making it "correct." The standard code of rules could be made applicable to the telephone system with slight emendations. There is, in fact, no difference in principle between telegraph and telephone despatching.

On a number of roads there is a complete change of method by which the operators disappear, at least from the despatcher's ken. In such systems the despatcher speaks directly to the conductor, and vice versa. There are telephones at each siding and station, but they remain silent until a train arrives whose conductor has to report to the despatcher. In order to work with advantage it is necessary for the despatcher to receive frequent reports; to do this trains must stop frequently. It, therefore, follows that this plan is best applied to a slow-speed road, where trains can stop often without serious disadvantage. The Huntington & Broad Top Mountain road is a coal road, which is here mentioned as one upon which this system in part has been worked for many years. If a busy road adopted this system where each train stopped at nearly every siding for orders to proceed to the next, it would amount to practically a rough block system, with all the blocks worked telephonically by one man. This idea is elaborated in some cases by additional devices intended to diminish the chance of error. On some roads the conductor receives an order and writes it out, the engineer repeating it back for "correct." On others two telephones are provided at each point in adjacent booths, and both conductor and engineer receive and repeat back the order. This latter arrangement, the author thinks, is hardly necessary. If the conductor writes down the order in duplicate, repeats it back and gives the engineer a copy, the precautions of a 19 order are secured, while if the engineer repeats it back as well, we have what amounts to a 31.

The experience of roads using the telephone in the way described, is to the effect that with proper precautions the despatching is safe when the equipment is modern and in good order. The system is especially adapted to new and poor roads and branches, where it is cheaper to run trains slowly than to fully equip the stations with night and day operators. It would also appear to be applicable for night work on lines without night operators. The chief theoretical difficulty is that when once a train order is given there is no means of stopping the train until it arrives at the point at which it was ordered to report. As despatchers are likely to want frequent reports, it all comes back to the statement made above, that the system is suitable only to a low-speed road.

Whether the standard roads will adopt the telephone for despatching is a question, but as block signals come in, the train order shows signs of going out. The train despatcher is as important as ever, but he issues orders, rather to operators than to conductors, and the operators use signals to get the trains around each other without stopping them. Possibly by the time standard lines are ready to entrust train orders to the telephone, they will have no train orders to telephone.

Shop Practice, Machinery and Tools

Improved Joint for Piston Packing Rings

American Engineer, January, 1901, p. 19.

A new form of joint for piston packing rings has been devised by Mr. Millard F. Cox, chief draughtsman of the Richmond Locomotive Works. It is designed to obviate the effects of wear and leakage of steam past the ends of piston rings. At the point where the ends of the ring come a socket is cut in the piston into which a plug is screwed loosely enough to permit of self-adjustment. This plug is cut to receive the ends of the ring, as shown in the illustrations. In Fig. 3 the plug has a rib across the central portion, and the rings are slotted to fit it closely. In Figs. 4 and 5 is shown an extension at the back of the plug. The hole for this is made smaller than the main cavity, and serves to assist in centering the larger hole. The extension increases the effectiveness of the bearing of the plug. The plug may be threaded into this hole, as indicated in Fig. 5. This figure also illustrates the construction used with wide rings. It will be seen this joint practically forms part of the ring. It may adapt itself to outward or inward movements of the ring and yet be tight against leakage. The ends of the rings are not exposed to steam pressure, and the walls of the rings are fitted flush with the wearing surfaces of the rings.

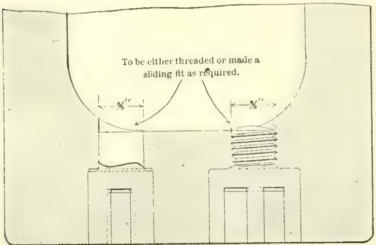


Fig. 4 This style used with narrow rings.

Fig. 5 This style used with wide rings

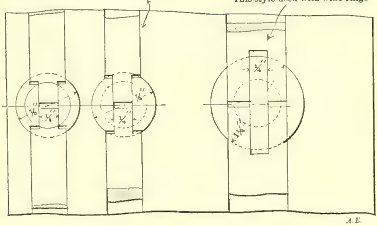


Fig. 1 Fig. 2 Fig. 3

Some Paint Shop Machines

Railway Age, Jan. 4, 1901, p. 15.

Difficulty has been experienced in the use of paint machines, which hold a considerable amount of paint, in the stopping up and rotting of the hose, the paint nozzle and the nozzle. Mr. W. K. Christie, master mechanic of the Pere Marquette road, who is stationed at Saginaw, Mich., has devised an apparatus which he has used with great success, and in which he has been able to use ordinary garden hose for a year. The

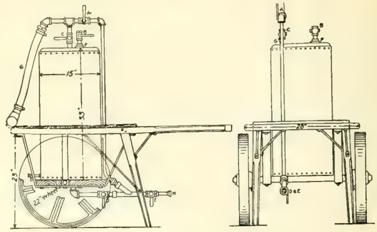


FIG. 1. PNEUMATIC PAINT MACHINE.

method employed to prevent the hose from being eaten away by the paint is very simple, and is merely the blowing out the contents of the hose every time after the apparatus is used. The reservoir may be of convenient size, say from 30 to 50 gallons capacity, and is mounted on a truck, as in Fig. 1. Details of the spraying nozzle are shown in Fig. 2, which gives a good spray without undesirable scattering. The system of piping and the location of the cocks show clearly how it is easy to blow out the hose after use.

A home-made form of paint burner is shown in Fig. 3. It

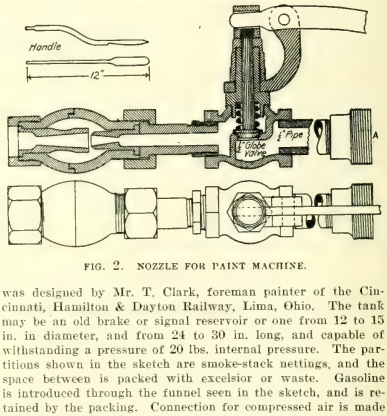


FIG. 2. NOZZLE FOR PAINT MACHINE.

was designed by Mr. T. Clark, foreman painter of the Cincinnati, Hamilton & Dayton Railway, Lima, Ohio. The tank may be an old brake or signal reservoir or one from 12 to 15 in. in diameter, and from 24 to 30 in. long, and capable of withstanding a pressure of 20 lbs. internal pressure. The partitions shown in the sketch are smoke-stack nettings, and the space between is packed with excelsior or waste. Gasoline is introduced through the funnel seen in the sketch, and is retained by the packing. Connection for compressed air is made by the hose shown. Air enters the lower chamber, passes up through the gasoline-saturated packing and through a ¾-in.

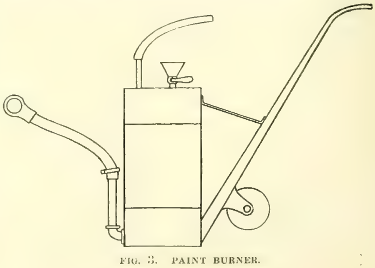


FIG. 3. PAINT BURNER.

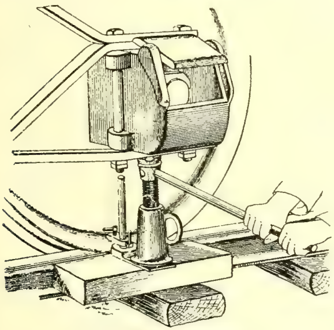
rubber hose at the top. If the air pressure exceeds 10 lbs. a regulator may be let into the supply pipe. The burner is a piece of gas pipe, attached to the end of the hose, and long enough to be held in the hands without danger of becoming too hot. A more perfect flame is made by using a sleeve of fine netting around the end of the gas pipe and extending beyond it, by which means a better admixture of air is secured. Several hose connections may be made from the same reservoir.

[What appears in the illustration to be a spout from the bottom of the reservoir is probably a handle for moving it about with wheel at the lower end.—Eds. Railroad Digest.]

Convenient Journal Jack Attachment

Railway and Engineering Review, Jan. 19, 1901, p. 40.

A very handy attachment for journal jacks has been devised by William Dunning, of Jamestown, N. D., for preventing the wheel raising during an interchange of journal bearings and thus interfering with such exchange.



HANDY JACK ATTACHMENT.

It consists, as seen in the illustration, of a base which receives the base of the jack. The base attachment extends toward the wheel a sufficient distance to permit a standard to arise therefrom, after the manner of the "old man" so much used in shop work. A clamp slides upon this standard, or column, and is provided with a set screw for attachment thereto. In an interchange of brasses the jack and this attachment are placed in position and the clamp is adjusted on the standard in a position where it reaches over the recess back of the tread and is then clamped. This prevents the wheel from lifting off the rail in the process of jacking—thus saving a very usual source of annoyance and delay.

Punch Instead of Drill

Railway and Engineering Review, Jan. 12, 1901, p. 23.

In "Shop Talk" the Review says that the drill press is called upon to do a lot of work which could be done more quickly and economically by a punching machine. It is very slack shop practice to send to the drill press hundreds of small clamps used on piping. The holes in tie bars for arch bar trucks, center plates and side bearing, holes when made in plate can be economically punched, and even holes in brake levers could be so made. There is a prejudice in favor of drilled holes, especially as regards brake levers which have neatly fitting pins, but in freight car work this appears to be a needless refinement, accompanied by greater cost. Freight car parts are not boiler sections.

The drill press does altogether too much of the work of the punch, and while crowded with work cannot be used for reaming out holes, and such reaming has therefore to be done by hand.

Medical and Surgical Matters

Does the Electric Current Kill?

Electrical Review, Jan. 26, 1901, p. 122.

The Electrical Review casts very serious doubt upon the belief that the electric shock administered at Sing Sing really kills. It holds that the autopsy which follows, is that which extinguishes life. The criminal really dies under the surgeon's knife. The horror of this fact—if fact it be—is dwelt upon. "It must be distinctly understood that until every effort has been exhausted to resuscitate a man shocked into coma in the electric chair there is no real evidence that he is dead. Indeed, from accumulated experience of several years of working with high-tension currents, and the recovery of persons severely shocked and apparently dead, it seems safer to say that the electrified criminals are living when they go to the dissecting room."

Increased Surgical Capacity by the Intelligent Assistance of Railway Employees

Railway Surgeon, Dec. 11, 1900, p. 336.

In his paper, read before the Association of Surgeons of the Southern Ry., Dr. F. B. Powers, of Lawrenceburg, Ky., makes one very strong point and emphasizes its great importance in a most striking manner. The point is that in treating wounds before the arrival of the surgeon, here perhaps more than anywhere else, cleanliness is indeed next to godliness. He shows that an unimportant injury may be made a very serious case by the ignorant application of all sorts of filthy and germ-laden substances. An extensive laceration of the middle finger of the left hand belonging to a negro section man when brought to him for treatment was found to have been dressed in the following manner: The outer bandage was a filthy handkerchief in two or three layers; amid the fumes of turpentine the doctor next came upon a layer of cobwebs and soot, below which was a layer of dirty black engine oil, followed by four well-masticated "chews" of tobacco, bedded firmly into the wound.

The speaker entered a strong plea for the elementary education of employees in the art of first aid to the injured and pointed out that if such rudimentary knowledge was possessed by the railway employee and if the traveling public was aware of the fact that the men on the road had been so instructed it would produce a greater feeling of security in the minds of the patrons of the road. Dr. Powers suggested the publication of a little book by the railway company containing information on this subject prepared by competent authorities to be placed in the hands of all employees, and expressed his willingness to deliver lectures on the subject. He urged on the attention of his colleagues the necessity of uniformity in instruction and co-operation among the surgeons of the different divisions of the road to help forward the good work. His address concluded with a resolution for the formation of a committee to bring the matter before the executive officers of the road.

Discussion of Preceding Paper

International Journal of Surgery, December, 1900, p. 379.

This article is a report of the discussion of Dr. F. B. Powers' paper on the above named subject. Dr. C. V. Boarman, of Washington, spoke of what were called emergency cases, or small tin boxes, having printed instructions on the four sides telling how to use the contents, how to control hemorrhage, how to apply material and what to do in general. The tin boxes contained five or six bandages, absorbent cotton, a paper of pins, Esmarch bandage, etc. (It may be stated that the Esmarch bandage is a triangular one, capable of an extended variety of uses which are often represented by pictures stamped on the bandage itself.) Dr. Boarman said he had seen more harm result from the use of a tourniquet in incompetent hands than was produced by the accident. He held that if emergency cases were used it was most important to instruct men in the use of the contained materials.

Dr. W. C. Connolly made some remarks about the rules which had been used by the old E. T., V. & G. road, and continuing said: "There are a few essentials that if carried out would cover the ground. If we could teach them to elevate the limb in hemorrhage, and keep all dirty bandages off the wound, and cleanliness of the wound, and something about fractures, such as placing the foot in line with the body, it would be a good thing; but if you undertake to teach them what antiseptics are and such things as that, it will not work."

Dr. W. C. Day pointed out that trouble had been experienced as the result of men putting all sorts of things into wounds.

An Address to the Association of Surgeons of the Southern Railway

International Journal of Surgery, December, 1900, p. 375.

Mr. W. E. Talcott, land, tax and claim agent of the Erie R. R., gave a short address on the railway surgeon's report from the standpoint of the claims department. He took a form used for accident reports on the Erie as his text, and urged the physician attending to state the character of an injury in plain, non-technical language, which could be understood by a layman, as railway officers were not possessed of any very great technical surgical knowledge. He said the blank before him asked for a statement in detail of the treatment and whether it was antiseptic or not. The speaker said he did not think this of very great moment. There were some cases of obscure injury where such information enabled the claim agent to judge whether there was actual injury or not. Antiseptic treatment was now the order of the day, and he did not consider the answer to that question very important.

The point on which Mr. Talcott laid great stress was the necessity for information on present condition and probable result. He said the claim agent wished to know if the patient would probably recover without permanent injury, or whether he would be more or less crippled. He admitted that a doctor could not always tell at the time he had to answer the question, but under those circumstances he asked for the medical man's best guess.

He thought it important for the medical man to get from the patient what he had to say as to how the accident had occurred. A physician could get this better than any one else, and get it without the bias introduced into the patient's mind by such a question coming from any officer of the railway company.

Miscellaneous

The Northwestern's Pension System

The Railway Age, Dec. 28, 1900, p. 505.

The Railway Age says that 25 years ago it began to advocate the adoption of some plan of pensioning aged employees by American railways. Mr. Marvin Hughitt, general manager of the Chicago & Northwestern, took especial interest in the subject, and indicated the hope that it might eventually be practicable to establish a pension fund. This week, says the Age, President Hughitt has had the pleasure of announcing to nearly 27,000 employees of the company that such a fund was about to be established. This gives the honor of being the first Western company to adopt the pension system to the Chicago & Northwestern Railway, the Pennsylvania Railroad having been the first in the United States. The Northwestern's plan is that the fund is provided entirely by the company, and apart from any beneficiary or insurance plan, to which employees on some roads are contributors.

The official announcement of the plan, signed by the president, is given in this issue of the Railway Age (Dec. 28, 1900), and is worthy of careful reading, for, as the writer of the article remarks, the many commendatory press comments which appear, unintentionally but seriously mis-state the basis of allowances and the principle upon which pensions are granted. Briefly, the chief requirements and agreements of the Northwestern plan are as follows:

Pensions are granted to those only who have been in the company's service 30 years or more.

When such employees reach the age of 70 years, "they shall be retired and pensioned."

After reaching the age of 65, they may be retired and pensioned if incapacitated for further service. The pension allowance is paid monthly, allowing for each year of service 1 per cent. of the average monthly pay for the 10 years next preceding retirement. The daily papers have made the serious mistake of failing to understand that the allowance is figured on all the years of service, the last 10 years being considered only for the purpose of determining what the average monthly pay is, on which 1 per cent. is figured yearly for 30 years or more. The Age then proceeds to give an example to illustrate the working of the plan. The desire of the company is to retain faithful efficient employees, and the employees want to remain in the service long enough to obtain the benefits offered.

The number of pensions, now small, will increase with great rapidity, and the total of the annual claims may ere long exceed the limit of $200,000 which the directors have fixed. In that case the basis may have to be reduced or the appropriation increased—most likely the latter course will be adopted. Judging from the mortuary tables of insurance companies, it is reasoned that the average life of those retiring at 65 or 70 will be from ten years to six years.

Mail Sack Catcher, N. Y. C. & H. R.

Railway and Engineering Review, Dec. 29, 1900, p. 731.

The illustration which we reproduce here by the courtesy of the Review shows a method of catching mail bags from a moving train which was used in some experiments on the Falls branch of the N. Y. C. & H. R. The idea is to catch the bag without damaging its contents. The sack is suspended from a framework which can be thrown out from the door of the car.

The double-ended chute is tapered to present an air cushion to the incoming bag. Appropriate mechanism releases the bag on striking the top of the chute. In the trial it is stated that the desired result was accomplished, the bag being caught from a rapidly moving train without detriment to the mail matter within. The illustration also shows an improved form of mail crane, which swings around out of the way after the bag it carried has been picked up by the train.

The Trans-Siberian Railway

Memoires de la Société des Ingenieurs Civils, November, 1900, page 536.

This article, which is by M. Platon Yankowsky, has special reference to the crossing of Lake Baikal. In the opening paragraph it is stated that the work of construction of the roads is nearly completed, and that the regular operation of the main line, having a length of 2,740 miles, from Tchéliabinsk, on the frontier of western Siberia, to Stretiensk, on the River Chilka, a tributary of the Amom, will be begun during the next six months.

The rail line is actually interrupted for a distance of about 45 miles by Lake Baikal, whose passage will be effected by means of transports in the form of ferry ice-breakers similar to those in use in the United States. The article continues with a detailed account of the methods that will be adopted in the operation, together with a description of the approaches and the boats.

The Mallet Compound Locomotives.

Le Genie Civil, Jan. 5, 1901, p. 149.

The engines are illustrated and are those exhibited at the recent Exposition in Paris. The type is too well known to need an extended description. The high-pressure cylinders are 15.6 in. diameter, the low 25 in., with a common piston stroke of 24½ in. The weight in working order is 67 tons, of which 56 tons are available for adhesion. The tender is carried on two bogie trucks, and has space for six tons of coal and about 4,500 gallons of water.

Educational Training for Railroad Service

Railway and Locomotive Engineering, January, 1901, p. 2.

Mr. John H. Goodyear, in this article, which shows that the writer has practical knowledge of conditions obtaining on railroads, does not think that the higher education of men entering service is the solution of the problem of increasing the standard of efficiency of railroad employees. The writer says: "Apart from the few available positions in the engineering and mechanical departments, there is practically very little in a railroad career to warrant men with the opportunity and means of acquiring higher education, devoting their time and money to acquiring what is—after all is said and done—but a theoretical knowledge of railroading the application of which would, for the majority of them, mean several years of hard work, moderate wages and discontent with their lot." Mr. Goodyear points out that most men who have attained to high positions in railroad service have risen from the ranks. He shows that for several years quite a number of prominent railroads have been solving the question by the following means: "1. Hiring none but men physically and morally fit, intelligent, fairly well educated and not over a certain age. 2. Furnishing facilities—in the way of instruction cars, etc.—whereby men can on the line of their road (each road having peculiarities, etc., of its own) receive practical instruction in regard to their work. 3. Establishment of relief and pension funds, etc., thereby inducing men to remain in the service of one company during their railroad life. 4. Promoting men from the ranks to official positions, and not hiring outsiders for responsible positions while there are men eligible for the position in the service."

Railway Mail Charges Not Excessive

Railway Age, Jan. 25, 1901, p. 62.

The Age points out that usually the services performed by the Government for the people are paid for in the form of taxes. No effort is made to make the army or the navy self-supporting. Litigants bear only a small share of the cost of the administration of justice, so that the annual deficit in the Post Office Department does not appear to be so very serious. Congress appointed a commission in 1898 with comprehensive instructions, "to investigate the question whether or not excessive prices are paid to the railroad companies for transportation of the mails and as compensation for postal car service," and, further, to inquire into "all sources of revenue and all expenditures of the postal service, and the rates of postage upon all postal matter." The report of the commission on the matter of railway mail charges was that they were not excessive. They found: "Upon careful examination of all the evidence and the statements and the arguments submitted, and in view of the services rendered by the railroads, we are of the opinion that the prices now paid to the railroad companies for the transportation of mails are not excessive, and recommend no reduction be made at this time."

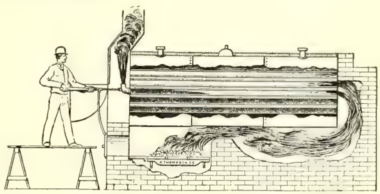
Prof. H. C. Adams has gathered an enormous amount of statistical data bearing on the subject. Mr. H. T. Newcomb, who has just published an exceedingly interesting and useful book of 150 pages on "The Postal Deficit," comes to the same conclusion as the commissioners. It is therefore satisfactory to find a practically unanimous verdict rendered that railway mail charges are reasonable by those who have approached the consideration of the subject both from the practical and the theoretical sides.

An Improved Boiler Tube Cleaner

Canadian Engineer (Toronto), January, 1901, p. 186.

The advantage of clean tubes in a boiler is admitted by all steam users. Soot is a non-conductor, and when it is permitted to remain in the tubes, heat is wasted. There are a great many appliances made for cleaning boiler tubes, but they do not always clean. Steam blowers are used to some extent, but a great many object to blowing steam into a tube on account of the moisture, which is liable to make scale. Then a scraper has to be used. This is a slow process, but the only alternative, as the tubes must be cleaned and should be cleaned often.

The accompanying cuts show a form of cleaner that is not open to the objection of steam blowers, as there is no steam admitted to the tubes, and it is claimed that it will do the work thoroughly.



By the use of a small amount of steam, which is first superheated by wire drawing through the apertures in the discharge tip, a vacuum is formed, drawing the soot from the tubes, and ejecting it with great velocity up the chimney and into the atmosphere, cleaning the tubes, flue and chimney.

Booklet "C," giving description of this cleaner can be obtained by addressing Richard Thompson & Co., Beard Building, Liberty street, New York. The device is said to work well.

"Industrial Supremacy" and American Competition

American Machinist, Jan. 10, 1901, p. 27.

This article is a series of cleverly put interrogations. The writer asks if it is not possible that too much stress is being laid on what we call "commercial and industrial supremacy." He further inquires, "Is it certain that because America seems likely to outstrip Great Britain in a number of lines of manufacture that Britishers need really suffer on that account?" At the present time the manufacturers of Great Britain have their order books full, and are making money. A man does not need to live in the country with the largest export trade in order to be contented and happy. It is a mistake to make

out that a calamity has befallen Great Britain simply because the United States is gaining on her in the race for the highest numerical expression representing our manufactures of machinery and the exports of the same.

The writer uses a striking illustration. He divides the United States into two areas by an imaginary line, each containing approximately equal portions of its manufacturing. If now these two areas were to maintain separate governments and be called by different names, either compared with Great Britain, would put the latter far in advance as an industrial and iron-producing country. That fact would not affect the prosperity of a single manufacturer or merchant in this country, so long as the two areas maintained absolute freedom of trade such as now exists between the various States of the Union.

A New Fuel Gas

Railway Master Mechanic, January, 1901, p. 9.

The new fuel gas is a product of petroleum. It is called acme gas. The plant for producing it consists of a series of generators with connecting apparatus and pipes. Its novelty consists in the appliance whereby refined petroleum is made into a fixed gas by forcing air under pressure of, say, 4 or 5 lbs. per square inch, through the oil (68 gravity distillate preferred), and through perforated diaphragms and a porous material. The gas produced is a fixed gas free from unassimilated hydrocarbons. It carries some oxygen (19 to 20 parts in 100) and is therefore more readily and completely consumed than if depending entirely upon the oxygen of the air—in fact, no part of the hydrocarbon constituents pass off unburnt. The products of combustion are $N + H_2O + CO_2$.

Acme gas can be used to give an oxidizing or a reducing flame, and is at all times perfectly under control of the operator. The manufacture of the gas is automatically regulated in the plant; it will supply its maximum number of burners, but if all the lights but one be turned off the plant adjusts itself so as to supply that one flame only, and will, when required, resume production for the maximum number of lights again. The fact that satisfactory conditions are automatically continued for any length of time make this gas invaluable for metallurgical operations, and in this it is superior to natural gas. Acme gas is invariable in the matter of quality, and that is a point which is perhaps of more practical importance to the consumer than a higher theoretical value in heat units.

The gas has been used by the U. S. Government in its navy yards for heating iron and steel.

The small generating plant of the Milwaukee Wagon Works is shown in an illustration, and also the Washington navy yard forge shop, and an oil and acme gas furnace, the latter having displaced the former in the Deering Harvester Works.

The process of manufacture is owned by the Acme Gas Company, of 1256 Monadnock Block, Chicago.

Brown's Discipline

Railroad Gazette, Dec. 21, 1900, p. 841.

There can be no question that the abolition of suspensions on American railroads has been a great success, notwithstanding that some prominent roads have decided not to change their methods, and that a few, after trying Mr. Brown's plan, have abandoned it.

The essential features of "record discipline" are so rational, and appeal to every one's sense of justice, that it is, perhaps, not to be wondered at, that every opinion expressed about it is a favorable one.

One reason why so many railroad officers have been convinced that suspensions are wrong, is to be found, no doubt, in the inherent illogical nature of the practice. The one objection which has been defined, and the only one, so far as the writer of the article knows, is that some men otherwise fit to be retained in the service, have such dull consciences, or such an inadequate sense of duty that nothing but a money loss will induce them to learn the lesson of a blunder. From a theoretical standpoint it seems that such conscienceless or senseless persons should be got rid of as soon as possible. That men appreciate the meaning of a record is constantly evidenced by offers from one and another to pay money losses incurred by their negligencies so as to preserve a clear record. Men show their appreciation also by the way in which they value the "merits" that they get. One conductor who had long had an excellent unwritten record, on receiving for the first time a letter from the superintendent, saying that the writer took pleasure in appraising him that his services had been satisfactory for twelve months, remarked to his wife that it was the first time in twenty years that he had had any information from the company as to the quality of his work one way or other. His wife promptly had the letter framed and hung in the parlor.

Reciprocity by the Railroads

American Lumberman, Jan. 19, 1901, p. 15.

The American Lumberman points to one of the chief equitable objections to the car service rules in operation on railways which is that while a penalty is attached to delay in loading or unloading cars, no penalty is attached to the railroads for delay, no matter how injurious to the business of its patrons. It might so happen that a lumber buyer might be kept waiting a week or two after a reasonable time had elapsed, and then get his car load perhaps with accumulated shipments. If his handling resources proved to be inadequate or the weather bad, he might fail in unloading within two days, and so be charged $1 a day demurrage. The writer states that there is a demand throughout the country for reciprocity between railroads and their customers. "Where legislative approval of the car service system is granted it should be accompanied by a requirement that railroads shall pay for delays."

In Alabama the Shippers' and Buyers' Mutual Aid Association of that State recently petitioned the railroads in Alabama as follows:

"We, the undersigned patrons of the railroads of Alabama and elsewhere, thinking the present rules of the Alabama Car Service Association are one-sided and arbitrary and unjust in requiring us to pay $1 a day for our delays unless (and we respectfully ask your attention and assistance in this matter) the railroad companies also pay the same amount for their delays, ask that the rule be put into effect in Alabama as in other States as follows, viz., 'When any railroad company fails to place loaded cars at an accessible place for unloading within forty-eight hours (not including Sundays or legal holidays), computed from 10 o'clock the day after arrival of same, the shipper or consignee shall be paid $1 a day for each day said delivery is so delayed.' Are you willing to assist us, and what are you willing to do? Please advise the chairman as promptly as possible."

The writer holds that this appeal is very moderate, and that railways will be wise in acceding to it; if not, they will probably go on as at present, and wake up some day to find a measure introduced into the Legislature of Alabama compelling them to pay for delays in delivery of goods.

The Passing of the Newsboy

Railway and Engineering Review, Jan. 5, 1901, p. 8.

"Among the new leaves turned over by many railways on the first of the year there is one which we think will materially lessen the annoyances of travel. This consists in abandoning the custom of carrying a news agent on passenger trains. We have been a strong advocate of such a measure and on several occasions during the past year have called attention to the manner in which passengers were annoyed by newsboys. A few lines have extended the time limit of this service until the end of February, but after that date there will be hardly a single line east of Chicago on which the train news agent will be in evidence. Several lines did not wait until the end of the year to take these men off and put them in charge of newsstands in the larger depots and an appreciation of the change was so noticeable that the revolution to the latter system has been very rapid. Western lines have not yet adopted the change, but it is to be hoped that an improvement in passenger service so easy to make will soon be put in force on these lines as well."

The highest salaried railroad man in the world is Charles M. Hays, who was recently made president of the Southern Pacific, the second largest railway system in existence. He receives $55,000 a year. Twenty-seven years ago he was a railway clerk in St. Louis earning $40 a month.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

Flatting of Varnish on Car Exteriors: Its Causes and Prevention

By C. A. Hubbs, Foreman Painter, Southern Pacific Company.

The flatting of varnish on old work, revarnished or cut in, is a subject that nearly every painter is, or has been, interested in; for, in the spring or summer months, after varnishing one of these cars and allowing sufficient time for it to dry, it is run out, and the first time the sun strikes it it either "silks" or becomes perfectly flat, except where there is a new board, or batten, or a puttyed spot, these standing out as bright as a new dollar. This (as has been my experience) does not happen on new work, but on old work touched up or cut in and varnished. I don't think there is anything more humiliating to a painter than to look at one of these cars after the sun has finished reducing its brilliancy, and he is frequently called upon by his superiors to explain the reason of the car looking so. I first thought it was the fault of the varnish, but as I frequently saw articles in the Car Journal on the subject I came to the conclusion that it was nearly a general thing in all car shops. The first thing a painter generally does when called upon to explain, is to blame it on the varnish, he says "it is not made right," "too much oil in its manufacture," or the gum is of an inferior quality, or that "it dries from the outside in." If the results were the same on new work, or on varnished work in good condition, then we might blame the varnish, provided it did not occur under adverse conditions of the shop or temperature.

On taking charge of the paint shop of the S. P. Co., at Portland, Ore., five years ago, I found this trouble to be so frequent that I determined to overcome it if possible, and succeeded perfectly. It is a self-evident fact that to produce an effect, there must be a cause, and to find it out and its remedy was the next thing to do. In looking over the proceedings of the Master Painters' Conventions, I found that the subject had come up for general discussion, and found a diversity of opinion on the subject. (This was in their 1896 convention.) Some said they had trouble with their new work before leaving the shop, and a great many had trouble with old work after leaving the shop. Some said it was due to too rapid varnishing, not giving the first coat more than two or three days' time to dry; others said it was due to the alkali in the soap used for scrubbing; others thought it was due to the varnish drying too slowly and from the outside, inward, and recommended putting rubbing varnish in the finishing coat, and using a quick drying varnish for the first coat, at the cost of durability. I tried putting in rubbing varnish in the hard body and finishing varnish, but it flatted just the same, and at the end of seven or eight months, the car was badly perished, so that plan would not do. I next tried giving a thin coat of varnish and turpentine, letting it get thoroughly dry and cut in, giving plenty of time between coats, but it still flatted, although not as badly as before. We had a contract for three cars from the Astoria and Columbia River Railway, with a great deal of lettering and ornamenting on them; the varnish was badly perished, but the gold and foundation good. To save painting, the cars were sandpapered thoroughly, touched up with lead, puttyed and cut in with Pullman color with a little raw oil in it. I knew that they would flat badly if something was not done to prevent, so I hit upon the plan of putting them out in the sun. The shop was so situated that a car could be run out and have the morning sun strike it on one side and the afternoon sun on the other. After giving them a coat of hard body varnish they were run out in the sun. The result was that they flatted badly, although looking well in the shop. They were left out for two days, the varnish striking in, hardening and uniting with the porous work underneath. They were then haired off, given another coat of hard body, left stand in the shop two days and given a third coat of wearing body varnish and when turned out a week after the sun had no effect on them whatever. I saw them sixteen months after, and they were in splendid condition.

On very dry cars three coats is, I think, the best, two of hard body and one of finishing, but the first coat is the only one that needs the extra heating. The more heating the first coat gets the better the last coat will turn out. I have noticed the remark made that a car will stand just as long with the varnish flat, as bright. After a close watch of different cars, I found the flatted ones did not last nearly as long as the bright ones, for when the varnish flattens it also becomes rough and full of tiny cracks which catch the dirt, water, etc. I might state we are using a California varnish which never causes any trouble whatever in pitting or flatting in the shop from dampness, draughts or changes in temperature.

From the above I have arrived at the conclusion that flatting of varnish on old work after leaving the shop, is caused by a porous and spongy foundation, as the new work and puttyed spots by their brightness prove, for a car with the varnish in good condition will not flat on revarnishing if the varnish is all right. Shops that have the proper heating facilities are not troubled in this way nearly as much as those that have not, for when the varnish is applied the surface of the car is warm, and the varnish dries evenly, but when it is applied to a cold and damp surface and the shop warmed after, it dries from the outside first, and this with the sealed-up dampness, will cause the varnish to flat to some extent, although not to the extreme that the other cause produces. Of course it is not possible in large shops, to thus treat the cars to a sun bath, but if the heat is properly looked to and arranged so as to give the car a good heating on the first coat of varnish, the trouble would be greatly reduced, the car would look better after being run out, and would run much longer without shopping.

Terminal Cleaning

Indianapolis, Ind., Jan. 24, 1901.

Editor Railroad Paint Shop.

Up to two or three years ago there were two things in social and political economy that were indelibly impressed on my mind. One was, "The poor ye have with you always;" the other was the "Tariff." I have lately been impressed with another in railway economy: "Terminal cleaning," and it is pertinent at this time to say that it is about as perplexing in its immediate zone as either of the others. Since the Detroit meeting I have been tempted several times to review that discussion, but felt that I might prove tiresome or uninteresting; but, like Banquo's ghost it won't down and I may as well relieve my burdened mind.

At the Detroit meeting I said it cost more to clean our passenger cars than it did to paint them, and gave the figures for the calendar year of 1899, i. e., painting, \$537,005.90, and \$51,721.41 for cleaning. Perhaps I should have added that this did not include supervision in either case, that being the amount expended for labor in the mechanical operation of each. With the supervision added the result would have been the same, only in a less marked degree. Of the \$51,721.41 expended in cleaning, \$43,356.34 was used in what we term ordinary cleaning, i. e., cleaning cushions, windows, lamps, closets, etc., and wiping with waste inside and outside of cars. The balance, \$6,-165.07 was for "modocing." This statement was questioned at the time by my good friend Ball, and commented on by you in an editorial in the October number of the journal, when you said: "It is somewhat startling, however, to hear the assertion that it costs as much to clean cars as it does to paint them. Such a statement might possibly be construed into an argument against carrying out the practice of terminal cleaning on a

thorough and extensive scale, but in reality it demonstrates the importance of the subject." Mr. Editor, ever since I made that assertion I have felt it incumbent on me to prove it to the satisfaction of others.

I had an intuition that such a statement would not go unchallenged, for in my paper at Detroit I said, "Did any of you ever stop to consider how much it costs a railroad company to keep its equipment not scrupulously clean, but just acceptably so? No doubt it will surprise many of you when I assert that no matter how systematic, practical and thorough you may be on the one hand or careless and improvident on the other, if you indulge in terminal cleaning to any appreciable extent it will cost your company as much per annum to clean your cars as it does to paint them. Do you realize that such is the fact?" Now while that statement was challenged at Detroit I have not as yet received the first intimation that it is not correct from any one who knows what it costs per annum to paint cars and to clean them. As my friend Ball did challenge my statement I now ask him if he knows how much it costs his company per annum to clean its cars?

I have before me statements from eleven different railways in various sections of the country giving the cost of daily or ordinary cleaning of passenger cars at terminals, and the average cost is about 60 cents per cleaning. One of these reports comes from part of my friend Ball's system, and reads as follows: "Cost of daily cleaning per car for all classes of cars, except Pullman, labor 61 cents, material 4 cents; total 65 cents. On our own line we report, labor, .38.6; material, .02.2; total, .40.8. This was the average for the year 1899, for all classes at all points and included even the sweeping and dusting of local cars at intermediate points, costing about 10 or 11 cents per car. To give a correct idea of the relative cost of cars at prominent terminals, such as quoted in the 65 cent case, I will give you the report we received from our Cincinnati Terminal for the month of December, 1900. We cleaned 2,494 cars of all kinds, except sleepers, at a cost of $1,317.67, an average of 52.8 cents per car. The cost for the different classes was 0.17.02 for baggage, 0.23.13 for mail cars, 0.40.04 for combination cars, 0.56.05 for coaches, 1.22 for parlor cars, 1.35.4 for dining cars. Now these are the cars that run daily, or nearly so, and are cleaned at least 300 times each a year (most of them 365 times), making the least average cost for cleaning $158.40 per car per annum. Now add your cost for soap and water cleaning, or emulsion if you please, and your cost is still greater. So you see, Mr. Editor, that while my assertion was somewhat startling, it was nevertheless true, for I don't think there are many roads that expend an average of $158.40 per car per annum for maintaining the paint.

I made the assertion at Detroit, "If we had been using soap and water it would have cost us $51,000 to do the painting, but the cleaning would not cost so much." Mr. Ball said it was only an assertion; that I couldn't prove it. I could not prove it then, nor can I now, but if I had access to my old paint-shop accounts in the C. & O. shop at Huntington, Va., I could prove it as easily as I think Fred Ball can prove that he is doing work cheaper now than twenty years ago. I would take the last two years of soap and water and the first two years of emulsion during which no change whatever was made in our methods or formulæ in the paint shop, and the result would be convincing. I must at this point say to him that these cars were cleaned during the soap and water regime under the supervision of a practical foreman painter, and we couldn't get the desired results. I presume "Fred" might do it, for he says he can clean a car safely with concentrated lye. I have heard of such cleaning before and I have encountered it in one or two shops where I have been employed, and it was always detrimental where used. And "Fred" won't practice what he preaches. Without any knowledge of his methods or without making an inquiry regarding same, I will venture the assertion that he does not use concentrated lye on any car that he recolors, much less revarnishes, and that he hasn't done it in ten years. The only place he might use it, not with safety, but with justification on the score of economy would be on the trucks of his coaches.

Mr. Editor, terminal cleaning is a "burning" question (too much so in regard to our paint and varnish) and that trite saying of one of our prominent men is very applicable, "What are you going to do about it?" Let me make a suggestion. The advisory committee meets in Cincinnati next month. I trust they will formulate some plan at that meeting that will prove beyond cavil or doubt, "Which is the best method of cleaning passenger cars at terminals." Our superiors have asked us and we can't tell them, and it is not to our credit that we have not been able to do so before this. Perhaps it is well not to be precipitate, but have we been as persevering and persistent as we should be? It is all very good to be guided by the golden rule on railroads, to "take the safe side in case of doubt," especially and imperatively so where life is at stake, but it has been my observation that the constant doubter and halter rarely proves much of a success. Suppose you make a failure? Try it again. Geo. Westinghouse didn't become discouraged when a certain railroad president was said to have remarked that he didn't have any time to spare for a fool that thought he could stop a train by simply using air. Lots of other people thought as he did, but Westinghouse didn't. It took years of hard work and hard study, but he got there. So can we, but we have to work for success as he did.

J. A. GOHEN.

Gloss Paints

Gloss is "trumps" in the phraseology of to-day by those who are playing their cards to introduce a freight car paint. Mr. G. Glisten Soshine comes along and says he has a paint which "has a great gloss"—something that when all others grow dim will "shine serenely on," as it were—something, in short, that is not phased by anything which time or things terrestrial may offer. Eternity alone, in fact, will be able to reveal that it is really, after all, of the earth (earthy).

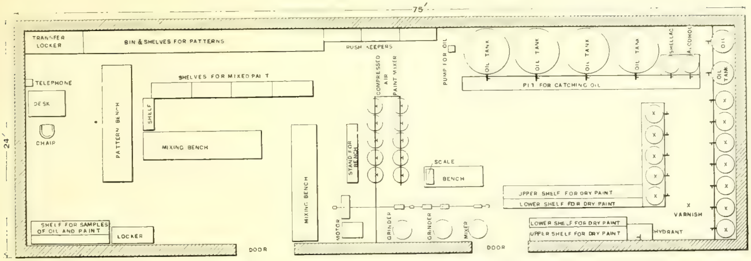
Now "talk is cheap," especially since machines were invented to do it, but facts are stubborn and sometimes costly things. The fact is, a paint that is got up for freight cars of the ready-mixed variety that depends for its luster upon gums will make the man who uses it show his teeth, some day, especially if gum rosin is the gum. "Beware of false prophets," is what the good Book says, ana you will run up against about as many of them in the painting trade to the square inch as anywhere else, all religions included. With good words and fair speeches they would fain deceive the hearts of the simple. But then, you, my dear reader, know that there is nothing better for freight cars, or houses to be painted with than the best white lead, or Prince's Mineral Brown, mixed in the best linseed oil. "Why do you specify Prince's?" This question is so common that it is a household word. This, or something similar, is the basis of all brown mineral freight car paint that is used nowadays, and is good for anything, whether it is stirred up in the back shop of Jim Jones or ostentatiously sent out from the factory of Brown, Smith & Co., duly labeled.

"But the gloss does not last long," you observe. No; but the pigment is there all the same and will wear, if it does not shine, like the leather in your boot if there is not a bootblack in town. The trouble with so-called gloss paints for exterior use is that they will crack up into fine checks in short order. Any gum will rob linseed oil of its elasticity.

The life of paint, everything being equal, is the oil (some opinions to the contrary, notwithstanding). When this is gone disintegration and death ensue. No artificial gloss should be attempted beyond what the best linseed oil will produce. If we could get genuine, old-fashioned kettle-boiled linseed oil to-day we could improve the gloss and endurance of our paints by the addition of a portion of it with the raw linseed; but alas! who knows what a barrel contains which is marked "boiled oil" nowadays? Doubtless the seed from which it was pressed was either caught with a hook or a seine; and the rest found company with it through the bunghole. A portion of a well-known Japan oil added to the raw linseed oil, for drying purposes, is as desirable as the commercial boiled oil of today. If paint is to be sprayed on with air-painting machines it will be superior in working, leaving a smooth surface, when the former will be "pebbly."

Intrinsic work is of some account as well as gloss; and it applies to more things than paint.

Mr. A. B. Burtis, the fathe of the "B. P. S." paints, announces (Jan. 23, 1901) that he is interested in, and has accepted the position of General Manager of The Mamolith Carbon Paint Company, with office headquarters 503 Johnston Building, Cincinnati, O.



PLAN OF PAINT STOCK AND MIXING ROOM, ST. LOUIS CAR COMPANY.

An Up-to-Date Paint Stock Room

We are indebted to Mr. Chas. Koons, Master Painter, St. Louis Car Co., for a plan, which we reproduce herewith, of a paint shop stock and mixing room, concerning which Mr. Koons writes as follows:

"I am mailing to you a plan of one of the most modern paint shops in this country, fully equipped for manufacturing anything and everything used by the up-to-date painter.

"The building is entirely separate from any of the other buildings and is heated by steam, is built of brick and floored with granitoid pavement, sloped to a trench for catching the drainage when washed—as it is every week. The power for grinding is transmitted by electricity. Electricity and compressed air are both used for mixing paints, putty, etc. The room has tankage for about 100 barrels of oil and turpentine; capacity and room for about twenty-five barrels of varnish, with bins and shelving for all kinds of pigments galore in the paint line, with a large storage bin for patterns, stock paints, mixed paints, brushes, etc."

It is very much of a back number of a railroad shop or car manufactory today that does not include in its facilities a well-arranged stock mixing room in charge of an orderly, bright man, who has a place for everything and everything in its place, and keeps it clean enough for "a ladies' sewing circle." The old slip-shod, slovenly, all-things-common way of handling paint stock in a scullery of divers pots and kettles at the top of seven hills of accumulated paint, while you stand in hollows of gathered slush, is about done away with, thanks to bright and progressive superior officers, up-to-date painters and last, but not least, the continued agitation of the Master Car and Locomotive Painters' Association, as echoed and re-echoed in their official organ. The man who does not come home from one of those conventions with "a bee in his bonnet" and an inspiration to have some things different, must either have things just about as near perfection as they can be, or else he is too dead to be inspired with anything. It would not be a bad plan for some railroad officers—if there are any left whose foreman painters do not attend our conventions—to send them along as a sort of test to see whether they will come home to exhibit any signs of renewed life and activity."

We congratulate the St. Louis Car Co., and Mr. Koons in particular, in having such a fine plant for this purpose, and hope they will see many seasons of prosperity to enjoy it.

NOTES AND COMMENTS

Our M. C. & L. P. A. portrait gallery goes by default this month on account of the failure of our expectations to materialize in season for this issue.

It is reported that Mr. W. L. Marsh, of the Alabama Great Southern shops at Birmingham, Ala., has relieved our old friend Speer of the foremanship of the Altanta & West Point paint shop at Montgomery, Ala., Jan. 15th. Who succeeded Mr. Marsh at the A. G. S., or where Mr. Speer goes, is not reported.

"The X-Y-Z Paint Company is the name of a new corporation at Evansville, Ind.; capital, $100,000; directors, R. P. Moore, J. T. Graham and J. G. Legrange. The plant is being moved from Princeton, Ind."

The above, clipped from an exchange, indicates that this concern, formerly an advertiser in the Car Journal, is to change the base of its operations. This is the system of painting of which Mr. Geo. E. Bryant, a member of our association, is the inventor, and who is the foreman painter of the L. E. & St. L. Ry. at Princeton, Ind.

"H. M. Foltz, foreman painter in the railroad shops at Bessemer, Pa., was struck by an engine and quite badly hurt, Dec. 15."

We clip the above from The Western Painter for January. Mr. Foltz is foreman painter for the Pittsburg, Bessemer & Lake Erie R. R. at Greenville, Pa., and was a member of our association in '98, though his name does not appear in later lists.

Mr. H. M. Butts, heretofore Supervisor of Passenger Equipment, N. Y. C. & H. R. R. R., is appointed Master Car and Locomotive Painter, effective January 1st, with headquarters at West Albany shops, and will have supervision of the methods and practice in connection with painting and varnishing of the car and locomotive equipment of that company, the position of Supervisor of Passenger Equipment having been abolished. We wish our esteemed associate abundant success in his new and enlarged relations. This comes to friend Butts as a new-year promotion, his duties hitherto having been the supervision of the cleaning of cars at terminals and inspecting and reporting them for shopping for varnishing or painting.

John Josenhans, a painter in the employ of the Pennsylvania Railroad at Pittsburg, Pa., has retired on a pension after a continuous service of 55 years with the Pennsylvania Company.

This marks the retirement of one of the oldest and most respected foreman painters in the railway fraternity and long a member of our association. This is the immediate result of the extension of the pension system of the Pennsylvania R. R. to the Pennsylvania Lines, on Jan. 1 last. Mr. Josenhans has of late years been relieved of the active duties of his long connection with the Pittsburg, Ft. Wayne & Chicago shops at Allegheny by his son, Wm. J., who has been a valuable assistant; but his venerable father has nevertheless been on duty. We have tried to obtain his photo and sketch for these columns in the past, but so far have been unsuccessful. We trust now that Wm. J. will furnish them for us at an early date as a fitting tribute to his father, who, though retired from active duty, we hope will long live to enjoy the esteem of friends and the comforts of home.

Since the country has been pretty well rent with the investigation of hazing at West Point there may be "a fellow feeling" for this scribe, knowing that he has a son there. The "dad" will therefore say that his son is alive and is doing well in his studies; and, as he gained 15 lbs. in weight during the summer encampment when this awful work is supposed to be done, I do not think he will die from hazing right away.

This department has been squeezed into very limited quarters in the January and February numbers; but it will hereafter be allotted its usual number of pages.

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D.C., and 727 Walnut Street, Philadelphia, Pa.

A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents the fixed Government charge.

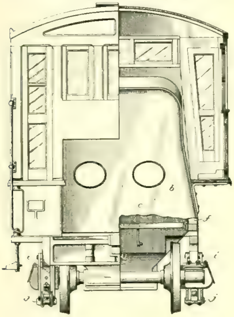
Locomotive

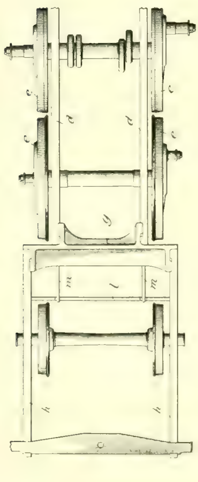
No. 665,070.

FREDERIC A. DELANO, of Chicago, Ill.

The principal object of the invention is to provide a locomotive having a wide and deep fire-box, with a frame and other parts to support and hold the same in an efficient and practical manner.

A further object of the invention is to provide a locomotive having a wide and deep fire-box and a trailing or rear supporting truck and wheels, with journals outside of such wheels, so as to diminish as far as possible the rolling motion of the engine and place the journal boxes where they are removed from the objectionable proximity to the ash pan and conveniently cared for.





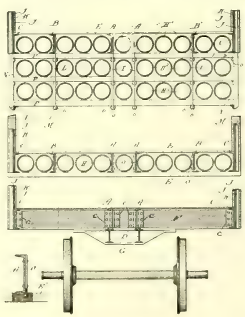
The invention consists, further, in a locomotive in which there are combined the ordinary driving wheels, a frame providing journal boxes for and inside the same back to the fire-box and wider outside frames beginning back of the rear drivers and extending back under the fire-box, and providing outside journal boxes for the trailing wheels.

Car Construction

No. 665,760.

HENRY H. SESSIONS, of Chicago, Ill., assignor to the Compressed Air Motor Company.

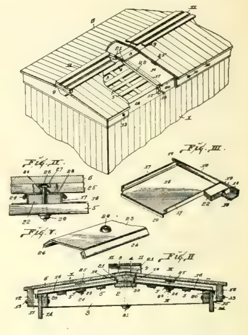
In a car, peripheral metallic channel bar sills having vertically disposed webs and inturned flanges, upright metallic angle irons secured to said sills and arranged in pairs, each member of each pair having one out-turned wing and one wing turned toward the other member, a metallic plate separating the members of each pair and secured to the adjacent angle iron wings and to a sill, and supports for compressed air holders secured to the longitudinal sills.



Car Roof

No. 665,642.

OLIVER LINK, of St. Charles, Mo., assignor to the St. Louis Car Roof Company.



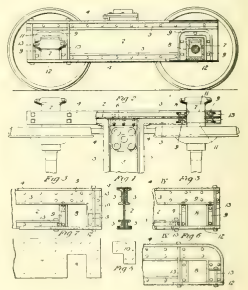
In a car roof, the combination of the plates 16 having laterally extending ears at their upper ends, strips 22 fitting between the plates and engaging said ears to hold the plates in position, and a cap 23 covering said strip and the edges of which interlock with said plates on opposite sides of the strip.

Car Truck

No. 666,342.

CYRUS M. CARNAHAN, of Allegheny, Pa.

In a car truck a composite side frame consisting of a plate having end recesses, upper and lower longitudinal reinforcing members at each side, and reinforcing frames surrounding the recesses, incorporated with the plate, and top and bottom longitudinal members embracing the edges of the plate and the longitudinal reinforcing members, and a lower removable frame inclosing the recess.

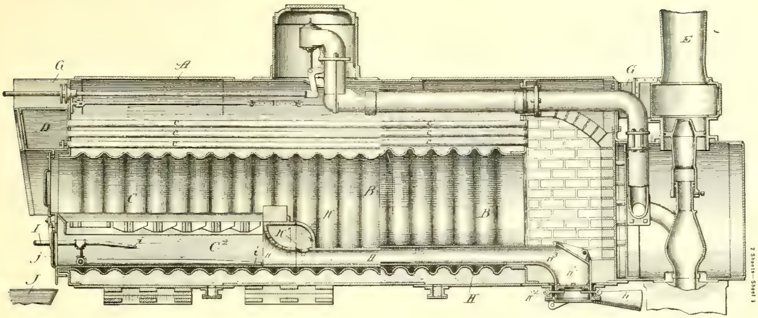


Locomotive Boiler

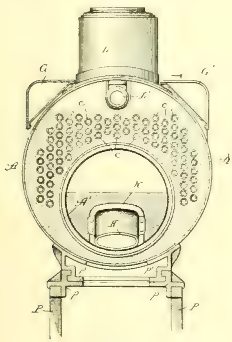
No. 666,392.

JOHN PLAYER, of Topeka, Kan.

In a locomotive the combination of a cylindrical inner shell forming a combustion and fire chamber, an outer cylindrical shell inclosing the combustion and fire chamber forming a water chamber which encircles the combustion and fire



chamber, a smoke-box, tubes extending through the water chamber forming passages there through and connecting the combustion chamber with the smoke-box, a smoke stack, and flues connected with the smoke-box and smoke stack arranged adjacent to the outer shell forming outlet passages from the smoke-box to the smoke stack.



Locomotive

No. 666,394.
JOHN PLAYER, of Topeka, Kan.

In a locomotive the combination with a boiler shell provided with a fire-box therein at the rear end thereof, of an ash pit within the boiler shell directly under the fire-box, an ash discharge and draft tube opening into the front end of the ash pit extending forward therefrom within the boiler shell and opening into the outer air, and tube mechanism for furnishing a supply of fluid under pressure through the ash pit to discharge the ashes through the tube.

Exhaust Mechanism for Locomotives

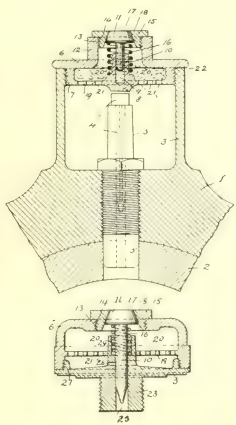
No. 666,395.
JOHN PLAYER, of Topeka, Kan.

In a locomotive, the combination of a stack portion provided with a smooth cylindrical bore at its lower end, an exhaust pipe made in two parts—a lower part and an upper part—adjustably secured thereto and snugly as well as adjustably fitting the smooth cylindrical bore of the stack.

Lubricator

No. 666,263.
MILLARD F. COX, of Richmond, Va.

In a lubricator, the combination of a lubricator cup, a lubricator cap, a valve seat removably attached to the lubricator

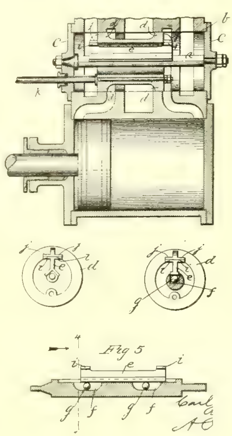


cap, a spring controlled conical valve, the exposed faces of the valve seat and of the valve together forming a plane surface when the valve is closed, a strainer integral with the lubricator cap and forming with the said cap a chamber adapted to contain filtering material, and having perforations adapted to allow the filtered oil to pass from the said chamber to the lubricator cup, and also having in its central part an upwardly extending projection bored so as to receive and form a guide for the stem of the valve, and also having another projection extending downward to form a stop for the oil plunger, an oil plunger and a spud bored so as to receive and form a guide for the stem of the oil plunger and to provide a passage for the oil from the lubricator cup to the bearing.

Piston Valve

No. 661,766.
CARL J. MELLIN, of Richmond, Va.

It is well known that horizontal and inclined piston valves wear out of the true circle both in the valve and the case or seat, and have to be frequently refitted and provided with new packing, or new valves have to be provided when packing rings are not used. I have therefore provided means to prevent such wear by a special bearing whereon the weight of



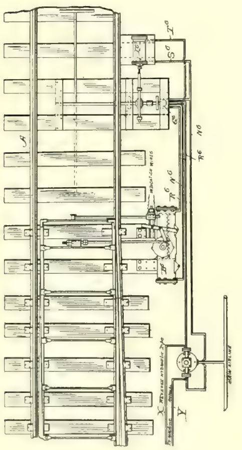
the valve is mainly carried, which bearing may be contrived in various ways; but as herein represented for a valve having a hollow center consists of a bar a, mounted centrally in the valve case b and supported at the ends in the heads c of the case, said bar extending through the hollow center of the valve d. The upper side of this bar is suitably fitted for a slideway for a bearing slide e, inserted in the hollow space and attached to the valve over the bar, so as to bear on said slideway and mainly or wholly support the weight of the valve, and thus relieve the under side of the valve from undue wear. The bearing surfaces of the bar and slide-bearing may be of any approved form, as the inverted V-shape or flat form, and anti-friction rollways f and rolls g may be provided in the bearing bars, or in the bearing slide. In this example of the invention the bearing slide e has flanges i at the ends, by which it is bolted to corresponding flanges j of the ends of the valves; but the means of connection may be varied at the will of the constructor.

Railway Switch and Signal Controlling Mechanism

No. 665,428.

JOHN E. GILLMOR, of Jersey City, N. J.

In a switch operating mechanism the combination of the following instrumental-



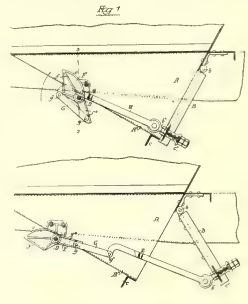
ities, to wit, direct operating mechanism in proximity to the switch points, a detector rod embodying a member adapted to contact with the rolling stock to check the movement of the rod, a control station with connections between the control station and direct switch operating mechanism, whereby the switch points may be moved without moving the detector rod and means for establishing or breaking the connections between the control station and direct switch point operating mechanism controlled by the detector rod whereby said detector rod controls by its position the direct connection between the control station and switch point operating mechanism.

Operating Gear for Doors of Hopper Bottom Cars

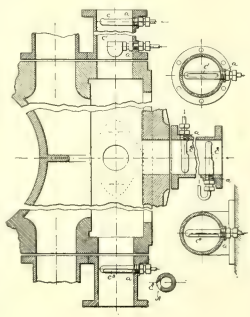
No. 666,160.

JACKSON SIMONTON, of Altoona, Pa.

In an operating gear for the inclined doors of a hopper-bottom car, the combination of a car body, a hopper in the bottom thereof, an opening thereto and a door hinged to said opening, a transverse shaft, bearings on the car body for supporting the same, a three-armed cam-



lever on said shaft, one of said arms being made to form a curved bearing surface, a link pivoted to a second arm of the said lever, an eyebolt in the door and a connecting bar between the link and the eyebolt, said bar having a hooked end constructed to fit the curved bearing surface of the said arm of the cam-lever, an abutment on said connecting bar, constructed to be engaged by the third arm of the said cam-lever, the pressure against the door when it is closed being transmitted through the connecting bar direct to one of the arms of the said cam-lever.



Attachment for Steam Engine Lubricators

No. 665,386.

AUGUST MLITZ, of Kattowitz, Germany.

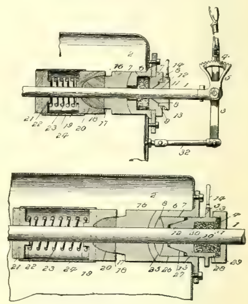
In lubricators for steam engines or like machinery, a hollow lubricator stem adapted to be mounted in steam pipes or conduits provided with a receptacle to retain oil, and an opening in the side of the stem opposed to the passage of steam through said conduits, one wall of which opening lies in a plane tangential to the periphery of the main bore of the stem.

Throttle Stem Packing

No. 665,542.

ROBERT EMMET McCUEN, of Lexington, Ky., assignor to the American Metallic Packing Company.

In combination with a locomotive valve stem, and packing therefor comprising a



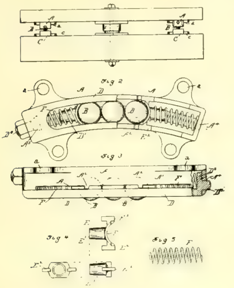
stuffing box and a gland, the latter having a tapering recess in its outer face and an enlarged portion internally threaded, a clamp nut having a split conical portion to enter the tapering depression of the packing gland and having an enlarged portion at the base of the conical part internally threaded to make screw thread connection with the aforementioned packing gland.

Side Bearing for Railway Cars

No. 664,888.

JOHN E. NORWOOD, of Baltimore, Md., assignor to the Baltimore Ball Bearing Company.

In a device of the character described, a casing adapted to contain anti-friction devices and consisting of a body portion formed at one end with an aperture and at its other end with an undercut socket, a removable pin adapted to fit in said socket, and a cap plate for retaining the anti-friction devices, said plate having a pin at one end adapted to fit in the apertured end of the body portion and an aperture arranged to receive said removable pin.



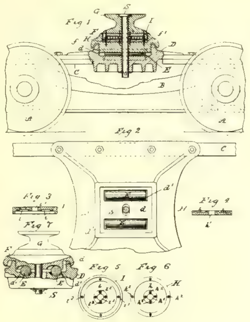
Lead-Truck Swivel for Locomotives

No. 665,997.
LEWIS CROWELL, of Concord, N. H.

A locomotive lead truck comprising a ball-bearing swivel and a roller side swing whereby said truck may more readily take and follow curves in the track.

Electromagnetic Brake

No. 666,183.
FRANCIS L. CLARK, of Pittsburg,



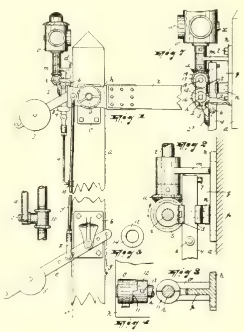
Pa., assignor to the Westinghouse Air-Brake Company.

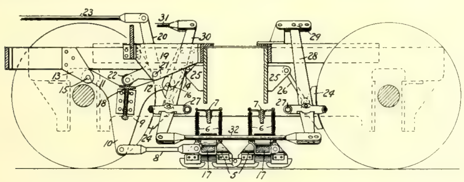
In a brake mechanism for cars, a rail-shoe, wheel-shoes for the wheels, lever having a shifting fulcrum, another lever connected to the wheel shoes adapted to be operated in the same direction by the lever having the shifting fulcrum when it is turned upon either fulcrum and a rail-shoe for actuating the lever having the shifting fulcrum in either direction according to the direction of the motion of the car.

Railway Signal

No. 665,712.
JOHN WRIGLEY and EDWARD McMAHON, of Elmira, N. Y.

In a signaling apparatus, the combination, with a suitable support, of an actuating mechanism, a paddle carrying lever fulcrumed on said support, a revolving





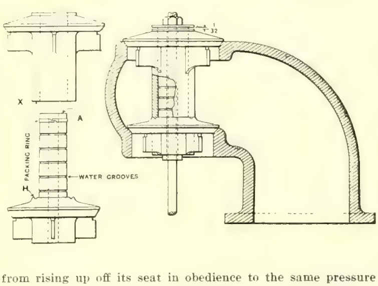
lamp journaled on said support, a slide rod carried by said support, operative connection between said lamp and the slide rod, a rod operatively connecting said lever and the actuating mechanism, and operative connection between said rod and the slide rod, said rod and the slide rod being movable in substantially the same direction.

Chambers' Compensating Throttle Valve

The throttle valve shown in the illustration is one patented by Mr. J. S. Chambers, division master mechanic of the Central Railroad of New Jersey. The object of the invention is to keep the valve tight, notwithstanding the slight distortions of the throttle case caused by the expansion and contraction of the metal under differing temperatures. Any one who has had to do with the operation or maintenance of locomotives, knows how supremely dangerous an engine can be with a leaky throttle valve, and he also knows how difficult and somewhat expensive is the work of grinding such a valve to a true, tight face. The actual doing of the work is usually put off until the very last moment. Any one, therefore, who comes forward with a device which will obviate all this trouble and expense is to be welcomed.

Mr. Chambers' valve, as illustrated, is clear enough as far as construction is concerned and simple enough also, for that matter. The valve consists of two parts, the stem of the lower disc fitting inside the enveloping stem of the upper disc, the former having a series of water grooves cut in it, at regular intervals, and a packing ring is used instead of the top groove. When put together the two discs are capable of approaching toward, or receding from, each other through 1-32 in. The valve is, therefore, capable of adjusting itself, or of compensating, as the inventor puts it, for any slight increase or shrinkage in the throttle case.

How this adjustment takes place is not quite so clear. It is evident that the upper disc is held down tightly on its seat by the pressure of the steam, but what prevents the lower disc



from rising up off its seat in obedience to the same pressure? The explanation given is that the pressure of the steam forces the water of condensation down past the water grooves, and that this film works its way between the faces at X and H and so keeps the lower disc tight, on its seat.

There is, however, one feature of the construction which should not be overlooked. The washer and nut which secures the bolt which passes up through the center of the valve, rests directly upon the upper surface of the stem of the lower disc, marked A in the sketch. In seating, the lower disc is brought to its place by the throttle mechanism, which locks on the out-

side of the boiler, and if expansion of the throttle-case has taken place, the upper disc is caught upon its seat, while the lower one is "placed," in the act of closing the valve. The two discs have then the greatest separation which expansion can give, though it is relatively very small indeed. The lower disc has its own weight plus the weights of bolt, nut, washer and part of the throttle crank to help hold it down, but this combination of mere weight would be insignificant against the upward effort of the steam. Mr. Chambers' experiments prove that it is not the locking or latching of the throttle handle outside the boiler which holds the lower disc in its place, as he made one test with the throttle lever loosened from the ratchet with most satisfactory results. After the throttle valve has been closed, and the lower disc "placed" by the throttle mechanism, the disc apparently shows no disposition to rise. A possible explanation of this is that when the throttle is open and the valve is enveloped in the powerful rush of hot steam into the dry pipe, that the water film is evaporated or drawn away, and that consequently the upper disc sinks down upon the lower, only to be caught again upon its seat in the act of closing the throttle, while the lower disc is carried to its position, and that the almost instantaneous reappearance of the water film in the closed case secures the lower disc in the continued and necessary tight contact with its seat, which renders this invention a satisfactory and valuable device.

Cleveland Car Foremen's Association

Minutes of meeting of Car Department Foremen's Association held at Y. M. C. A. building on St. Clair street, Monday evening, Jan. 28, 1901.

Meeting opened at 8.15 p. m. Vice-president presiding, with nine members present.

Minutes of previous meeting were read and approved.

Secretary reported $9.25 on hand in treasury.

The following new members were enrolled: J. J. Miller, general foreman L. S. & M. S. Railway, Cleveland, Ohio; R. V. Stuhler, shop clerk, L. S. & M. S. Railway, Cleveland, Ohio.

On motion the matter of renewing subscription for Railroad Digest was laid over until the next meeting.

The secretary stated that the Kennard hotel had kindly agreed to allow the association use of one of its rooms in which to hold its meetings one afternoon or evening each month, and on motion of Mr. McCabe it was decided to hold the next meeting at the Kennard, corner Bank and St. Clair streets, Saturday, Feb. 23, at 3 p. m.

The following officers were unanimously elected for the ensuing year:

President—A. Berg, chief joint inspector, Elyria, Ohio.

First vice-president—H. J. Merrell, clerk, L. S. & M. S. Ry., Cleveland, Ohio.

Second vice-president—J. B. Marble, chief joint inspector, Youngstown, Ohio.

Secretary-treasurer—J. C. Dennerle, clerk, L. S. & M. S. Ry., Cleveland, Ohio.

Messrs. J. D. McAlpine and W. Fenwick were appointed as the Executive Committee, and Messrs. McAlpine, Marble and A. A. Trace as the Committee on Subjects.

A motion that an order be drawn on the treasurer for the last quarter salary of secretary-treasurer was carried.

After a topical discussion on the M. C. B. Rules, etc., meeting adjourned.

When the Rand Mines, Ltd., of Cape Colony, decided to purchase 334 steel coal cars, the Pressed Steel Car Company of Pittsburgh would have received the entire order had it not been for adverse criticism and insinuations of disloyalty made in Great Britain. These criticisms were peculiarly disagreeable on account of the Boer war; but in spite of them, 167 pressed steel hopper gondola coal cars, of 60,000 lbs. capacity, were ordered from the Pittsburgh company.

On the morning of Jan. 28 the first consignment of 30 cars were lying alongside the steamer "Ellerie" in Jersey City. Thirty more of the cars were shipped to Jersey City Jan. 29, and by Feb. 4 the remaining 107 cars were waiting to be stowed away for the long ocean trip to Cape Town.

The 167 cars made in Pittsburgh will reach their destination before those made by the English competitors.

PERSONALITIES.

C. Skinner, master mechanic of the Western division of the Chicago & Alton at Slater, Mo., has been appointed road foreman of engines and air-brake instructor of the Eastern division, and the office of master mechanic has been abolished.

John H. Goodyear has resigned as assistant general superintendent of the Buffalo & Susquehanna, and the office has been abolished. Mr. Goodyear has been appointed chief clerk to the superintendent of the Buffalo division of the Delaware, Lackawanna & Western, with office at Buffalo, N. Y.

Albert Waycott has resigned the position of vice-president and general manager of the More-Jones Brass & Metal Company, of St. Louis, and will devote his entire attention to the Waycott-Andrews Supply Company, which was recently organized to succeed Albert Waycott & Co. The Waycott-Andrews Supply Company controls the sale of the product of the More-Jones Brass & Metal Company.

Mr. J. C. Halladay, for many years Western sales agent of the Pickering Spring Company, of Philadelphia, with headquarters at the Great Northern Building, Chicago, has resigned, and has accepted a position with the Chicago Pneumatic Tool Company in a similar capacity. Mr. Halladay will have charge of the sales in a new department to be established by the Chicago Pneumatic Tool Company about March 1.

T. R. Browne, master mechanic of the Juniata shops, Pennsylvania Railroad, resigned Jan. 19 to accept a position as manager of the Westinghouse Air-Brake Works at Wilmerding, Pa. He is succeeded by W. H. Bennett, who was previously foreman of the erecting shops at Juniata, and also inspector of new locomotives built for the P. R. R. Company at the Baldwin Locomotive Works. Mr. Bennett has been an employee of this company since 1872, starting as an apprentice in the Altoona machine shops.

Charles K. Thomas, who, since early in 1900, has been a special representative of the Railway Age, has resigned that position, and has been appointed general sales agent of the Reliance Machine & Tool Company of Cleveland. This company manufactures the Morgan patent bolt cutter. Mr. Thomas possesses in a marked degree the qualifications of a successful salesman, and his personality, otherwise, is such that, so far as his bolt cutter brings him into railroad circles, he will be welcomed as a desirable acquisition to the charmed circle of the railroad supply trade. He will doubtless find selling bolt cutters a more lucrative and congenial occupation than the selling of "space;" for it has been established as an axiom that a man who can sell space can sell anything.

J. L. Greatsinger, president of the Duluth & Iron Range, has been chosen president of the Minnesota Iron Company also.

H. B. Brown, traveling engineer of the Baltimore & Ohio, has been appointed master mechanic of the shops of that road at Chicago Junction, Ohio.

T. M. Price has been appointed master mechanic of the Findlay, Fort Wayne & Western, with headquarters at Findlay, Ohio, in place of H. A. Hansgen, resigned.

George Sargeant, Jr., has been appointed engineer of maintenance of way of the Erie Railroad, with headquarters at Jersey City, N. J., to succeed J. R. W. Davis, resigned.

John F. Miller, who on Jan. 1 retired from the position of general superintendent of the Pittsburg, Cincinnati, Chicago & St. Louis, has been elected vice-president of the Cleveland, Akron & Columbus, which is controlled by the Pennsylvania lines.

A. L. Morgan, engineer of maintenance of way of the Cincinnati & Muskingum Valley, has been appointed engineer of maintenance of way of the Pittsburg, Cincinnati, Chicago & St. Louis, with office at Pittsburg, Pa., in place of W. C. Cushing, promoted.

E. St. John has resigned as vice-president and general manager of the Seaboard Air Line. Mr. St. John was formerly for many years with the Chicago, Rock Island & Pacific as general

ticket and passenger agent, assistant general manager and general manager, leaving that road on Jan. 1, 1895, to become vice-president of the Seaboard Air Line. He was appointed general manager of the latter road in addition to his duties as vice-president on Jan. 22, 1896.

W. T. Reed has retired from the position of mechanical superintendent of the Seaboard Air Line, and the office has been abolished. F. H. McGee, master mechanic of the road at Americus, Ga., has been appointed superintendent of motive power, with headquarters at Portsmouth, Va. Mr. Reed has been in charge of the mechanical department of the Seaboard Air Line since 1895, and was formerly superintendent of motive power and rolling stock by the Chicago Great Western. Mr. McGee has been division master mechanic at Abbeville, S. C., and Americus, Ga., since Dec. 1, 1895, and was formerly master mechanic of the Central of Georgia for a number of years.

H. E. Poronto has been appointed purchasing agent of the Union Stock Yard and Transit Company of Chicago, and of the Chicago Junction Railway, with office in the Exchange Building, Union Stock Yards, Chicago.

Samuel W. Miller, assistant master mechanic of the Pennsylvania Lines West of Pittsburg at Indianapolis, Ind., has been appointed master mechanic, to succeed William Swanston, resigned.

E. A. Lycett has resigned his position with Joseph T. Ryerson & Son, of Chicago, and will be made sales agent for the American Steel and Wire Company, with office at Cleveland, Ohio.

Lewis Neilson, heretofore assistant secretary of the Pennsylvania Railroad, has been chosen secretary of that company, to succeed John C. Sims, deceased.

T. A. Foque, heretofore assistant mechanical superintendent of the Minneapolis, St. Paul & Sault Ste. Marie, has been appointed mechanical superintendent of that road, with headquarters at Minneapolis, Minn., to succeed E. A. Williams, resigned. Mr. Foque has been connected with the road since 1888, and has been consecutively draughtsman, chief draughtsman, engineer of tests and assistant mechanical superintendent, having been appointed to the last-named position in October, 1894. He is secretary of the Northwest Railroad Club.

Roger Atkinson has resigned as superintendent of rolling stock of the Canadian Pacific. He has been in the service of the road since 1882, and was for the first eight years in charge of the drawing office. From 1890 to April, 1893, he was general foreman; from April, 1893, to Dec. 16, 1895, acting mechanical superintendent; from December, 1895, to April, 1900, mechanical superintendent, and was appointed superintendent of rolling stock in April of last year.

E. A. Williams, for the past seven years mechanical superintendent of the Minneapolis, St. Paul & Sault Ste. Marie, has been appointed superintendent of rolling stock of the Canadian Pacific, with headquarters at Montreal, in place of Roger Atkinson, resigned. Mr. Williams has been in railway service since 1865, beginning as machinist apprentice with the Chicago, Milwaukee & St. Paul. He remained with the road until July, 1890, serving successively as roundhouse foreman, general foreman and assistant general master mechanic. He was master mechanic of the Soo Line from July, 1890, to September, 1893, and has been mechanical superintendent since the latter date.

Mr. F. J. McIntosh, recently connected with the Shelby Steel Tool Company, has been appointed superintendent of the Seamless Steel Tubes Company, of Detroit, of which Mr. William Thornburgh is vice-president and general manager. The Seamless Steel Tubes Company now have their plant completed and in operation, and report encouraging prospects for business.

The staff of the Railway Review of Chicago has been strengthened by the appointment of Mr. W. M. Simmons as Western manager. Mr. Simmons has had wide experience as a railroad and newspaper man which well qualifies him for his new work.

Evidences that our guess about the inwardness of Carnegie's $12,000,000 "pipe" proposition for Conneaut was a good one continue to multiply. That Conneaut will not be banking pay rolls on that enterprise for some time is a pretty sure thing.

OBITUARY.

S. H. Jensen, foreman of car shops of the Pennsylvania Railroad at Buffalo, N. Y., died in that city on Dec. 27, at the age of 55 years.

John R. Hilliard, formerly, for many years, superintendent of the Rock Island & Peoria, died at his home in Peoria, Ill., on Jan. 5, at the age of 80 years.

William C. Baker, the well-known pioneer manufacturer of car heaters, was struck by a train and fatally injured at Montclair, N. J., on Feb. 6, and died a little later as he was being carried to the hospital. He was walking to the station along the track and did not notice the approach of an express train in time to be able to get out of the way. He was 71 years old.

John C. Sims, secretary of the Pennsylvania Railroad, died at Philadelphia on Jan. 6, as the result of an operation for appendicitis, which was performed on Dec. 11. Mr. Sims was born at Philadelphia on Sept. 12, 1845, and graduated from the University of Pennsylvania with the class of 1865. He entered the Pennsylvania Railroad on Jan. 1, 1876, as assistant secretary, and held that position until he was elected secretary of the company on March 23, 1881. He had also been superintendent of the Pennsylvania Railroad Employees' Saving Fund since Jan. 1, 1898.

Clement Hackney, formerly superintendent of machinery and rolling stock of the Union Pacific Railway, and afterward general manager of the Fox Pressed Steel Company, died at his residence in Milwaukee, Wis., on Jan. 6, at the age of 54 years. He was born in Warrington, England, on May 16, 1846, and began his railway career in February, 1860, serving three years as apprentice in the shops of the Prairie du Chien Railroad at Milwaukee, Wis. From 1863 to July, 1865, he was locomotive fireman on the same road and then, until May, 1871, locomotive engineer on the Chicago, Milwaukee & St. Paul. From May, 1871, to March, 1876, he was master of transportation of the Milwaukee Iron Company, and from March, 1876, to June, 1878, in charge of the mechanical department of the same company. In June, 1878, he went to the Atchison, Topeka & Santa Fe Railroad as assistant superintendent of machinery and held that position until Dec. 1, 1885, when he became superintendent of machinery and rolling stock of the Union Pacific R. R. He became general manager of the Fox Pressed Steel Company in 1891, and, after the absorption of that company by the Pressed Steel Car Company two years ago, was made district manager of the latter at Joliet, which position he held until Aug. 1, 1900.

The Master Mechanics' Association Scholarships

Concerning this subject, the following circular has been issued by the secretary:

At the Stevens' Institute of Technology, Hoboken, N. J., there is now one vacancy in the scholarships of this association, and it is expected that one scholar will graduate next June, so that there will be two vacancies at that time.

Under the provisions of Article 7 of the constitution, candidates for these scholarships at the June examinations are confined to "sons of members or sons of deceased members of the association."

If there be not a sufficient number of such applicants for the June examinations, then applications will be received from other railroad employees or their sons, for the fall examinations, preference being given to the sons of employees or sons of deceased employees of the mechanical department.

The spring entrance examinations will be held at Stevens' Institute of Technology, Hoboken, N. J., on June 18, 19, 20, 21 and 22, 1901.

Candidates for these scholarships should apply to this office, and if found eligible will be given a certificate to that effect for presentation to the institute authorities, which will entitle them to attend the preliminary examinations.

Successful candidates will be required to take the course of mechanical engineering.

JOS. W. TAYLOR,
Secretary.

Record of New Equipment

Ordered during the Month of January 1901

CARS

Ordered by	No.	Class.	To be built by.
American Trading Co.	300	Box.	Am. Car & Fdry. Co.
A., T. & S. F. R. R.	1,300	Box.	Ill. Car & Eqt. Co.
" " "	500	Box.	Mt. Vernon Mfg. Co.
Barrett Mfg. Co.	20	Box.	Am. Car & Fdry. Co.
B., C. R. & N.	500	Box.	" " " "
B., R. & P.	10	Passenger.	Jackson & Sharp Co.
C., B. & Q.	20	Passenger.	The Pullman Co.
" "	100	Freight.	Am. Car & Fdry. Co.
Cent. Chemical Co.	10	Tank.	" " " "
Choc., Okl. & Gulf	400	Box.	Mt. Vernon Car Mfg. Co.
" " "	300	Box.	So. Car & Fdry. Co.
" " "	100	Box.	Georgia Car & Mfg. Co.
C., L. & W.	500	Coal.	The Pullman Co.
" "	150	Box.	" " "
" "	50	Stock.	" " "
C., M. & St. P.	250	Refrigerator.	Own shops.
" " "	20	Passenger.	Barney & Smith Co.
" " "	2	Passenger.	Jackson & Sharp Co.
" " "	200	Ore.	Own shops.
" " "	50	Ballast.	Rodger Ballast Car Co.
Coahuila & Pacific	25	Box.	Am. Car & Fdry. Co.
C., R. I. & P.	500	Box.	The Pullman Co.
" "	50	Passenger.	" " "
" "	500	Coal.	" " "
C., & N. W.	3,000	Box.	Haskell & Barker Co.
D., L. & W.	15	Passenger.	Barney & Smith Co.
" "	25	Freight.	Am. Car & Fdry. Co.
Erie R. R.	500	Box.	Pressed Steel Car Co.
" "	10	Refrigerator.	Erie Car Works.
Goodwin Car Co.	100	Dump.	Am. Steel Fdry. Co.
Gulf & Ship Island	20	Ballast.	Rodger Ballast Car Co.
Int. & Gt. Northern	500	Box.	Am. Car & Fdry. Co.
" " "	500	Coal.	" " " "
Iowa Central	50	Box.	" " " "
K. C., Ft. Scott & M.	8	Passenger.	The Pullman Co.
Los Angeles Tem. Co.	100	Flat.	Am. Car & Fdry. Co.
" " " "	10	Passenger.	" " " "
" " " "	100	Freight.	" " " "
Mex. Int.	20	Gondola.	Sterlingw'h Ry. S'ply Co.
" "	500	Coal.	The Pullman Co.
Mich. Cent.	200	Box.	Am. Car & Fdry. Co.
" "	100	Flat.	" " " "
M., K. & T.	1,000	Box.	" " " "
" " "	1,000	Coal.	" " " "
Missouri Pacific	46	Box.	" " " "
" "	25	Passenger.	" " " "
" "	16	Stock.	" " " "
" "	11	Furniture.	" " " "
Northern Pacific	3,000	Box.	" " " "
" "	800	Flat.	" " " "
" "	450	Coal.	" " " "
N. Y., N. H. & H.	20	Passenger.	Osgood, Bradley & Sons.
Peo. Gas Lt. & C. Co.	8	Tank.	Ill. Car & Eqt. Co.
Pere Marquette R. R.	60	Ballast.	Rodger Ballast Car Co.
Pittsburg Coal Co.	500	Coal.	Pressed Steel Car Co.
" " "	500	Coal.	Ill. Car & Eqt. Co.
St. L., Belleville & So.	200	Coal.	Am. Car & Fdry. Co.
St. L. Southw'n	200	Box.	" " " "
Silverton Northern	20	Freight.	" " " "
Texas Midland	5	Passenger.	" " " "
Vandalia	125	Coal.	" " " "

The Chicago rabbeted grain door has been specified for box cars recently ordered by the following roads, and now in course of construction, to the number shown in each case: "Big Four," 2,200; C., R. I. & P. Ry., 1,500; Northern Pacific R. R., 3,000; A., T. & S. F. R. R., 2,000; Rio Grande Western, 100. As these cars form a very liberal proportion of box cars recently let, the fact is eloquent testimony to the merits of the Chicago grain door.

The Simplex Jack Company, 319 The Rookery, has been consolidated with A. M. Crane & Co., 734 Rookery. Mr. Templeton, the general manager, has gone to Crane & Co. as secretary.

LOCOMOTIVES

Ordered By.	No.	Class.	To be built by.
Ala. & No. Carolina	2		Baldwin Loco. Works.
A., T. & S. F. R. R.	50	Freight.	" " "
Ariz. & N. M.	3		" " "
B. & O. R. R.	20	Consolidat'n.	" " "
C., B. & Q. R. R.	10	Prairie.	" " "
" " "	20	Prairie.	" " "
Choc., Okla. & Gulf	22		" " "
" " "	6	Passenger.	" " "
" " "	4	Consolidat'n.	" " "
C., R. I. & P.	53	Freight.	Brooks Loco. Works.
" "	6	Switching.	" " "
C., St. P., M. & O.	4		Schenectady Loco Works.
D., L. & W. R. R.	20	Consolidat'n.	" " "
Erie R. R.	25	Consolidat'n.	Baldwin Loco. Works.
Grand Rapids & Ind.	4		" " "
Grand Trunk	12	Mogul.	Own shops.
Hocking Valley	5	Consolidat'n.	Brooks Loco. Works.
" "	5	Switching.	" " "
Illinois Central	30	Mogul.	Pittsburg Loco. Works.
" "	5	10-w. pass.	" " "
" "	5	Switching.	" " "
Int. & Gt. North.	15	10-w. pass.	Cooke Loco. & Mach. Co.
Jacksonville S. W.	1		Baldwin Loco. Works.
K. C., F. S. & M.	6	10-w. pass.	Pittsburg Loco. Works.
" " "	2	8-w. pass.	" " "
Louis. & Nashville	10	Consolidat'n	Internat. Power Co.
Michigan Central	6	Passenger.	Schenectady Loco. Works
" "	4	Comp. cons'l.	" " "
Missouri Pacific	25		" " "
Northern Pacific	20	Switching.	" " "
" "	5	Freight.	" " "
P., B. & L. E.	1		Baldwin Loco. Works.
Penna. R. R.	48	Mogul.	" " "
Pere Marquette	18		" " "
" "	5		Brooks Loco. Works.
Phila. & Reading	50	Comp.	Baldwin Loco. Works.
Rich., Fred. & Potom.	2		" " "
Rio Grande Western.	5		" " "
Shreveport & R. R. V.	3		" " "
St. L., Troy & East.	1		Richmond Loco. Works.
Wabash R. R.	34	Comp. Mogul.	" " "
" "	4	Switching.	" " "
" "	6	10-w.pass.	" " "
" "	6	Atlantic.	" " "
Wheeling & Lake Erie	15		Baldwin Loco. Works.
Western Maryland	10	Freight.	" " "

The Thornburgh Coupler Attachments Company of Detroit reports having sold equipment for 2,000 freight cars during the month of January, making a total of 7,000 cars ordered to be equipped since November last. It is commonly remarked that W. N. Thornburgh is making a great success in his management of the business. Certainly orders received do not discredit the assertion.

The Bettendorf Axle Company has opened new and spacious sales offices in the Old Colony Building, Chicago, where both Mr. Bettendorf and Mr. Macpherson now have headquarters. The Cloud Truck Company no longer possesses the sales agency for Bettendorf bolsters.

The Industrial Water Purifier Company of Chicago announces that it has changed its corporate name to the "Kennicott Water Softener Company." This action was taken owing to the fact that the former title caused the company to be confounded with another having a very similar name. The railroad agency of the company is held by the J. S. Toppan Company, of 77 Jackson Boulevard, Chicago.

The 50 engines ordered by the Wabash from the Richmond Locomotive Works will be equipped with Midvale tires, United States metallic packing, Westinghouse brakes and train signals, Michigan lubricators, Ohio injectors, Sterlingworth brakebeams, Ashton safety valves, Crosby gauges and Scott springs.

RAILROAD DIGEST

Formerly The Railroad Car Journal

ENTERED AT THE NEW YORK POST OFFICE AS SECOND-CLASS MATTER.

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EDWARD A. PHILLIPS ALBERT G. GLOVER
GEORGE S. HODGINS, Editors

Vol. XI MARCH, 1901 No. 3

"Punch's" Advice

Senator Hoar in discussing what is known as the car coupler bill, which requires sworn statements of all railway accidents to be filed with the Interstate Commerce Commission, revived that humorous bit of advice given years ago by the London *Punch*, as the best method of reducing railway accidents in the United Kingdom. Paraphrasing *Punch*, Mr. Hoar said: "Nobody doubted that it would add 50 per cent. to the safety of railroad travel if a director of the railroad were tied to the front of the locomotive."

Locomotive Nomenclature

A point which we made in an editorial on Locomotive Nomenclature, in the January number of the *Digest*, has possibly been the means of suggesting a modification in each of two plans presented. In any systematic scheme of classification of types of engines it is important that the form of representation shall be capable of being spoken as concisely as it is of typewritten expression. Therefore, all forms which depend upon the use of large and small figures, or upon capital and small letters, are open to this objection, that the size of the letters or figures cannot be properly indicated, in speaking, without the use of some explanatory word or some other method of indicating the "size" element in each group, unless the speaker is, as we said before, willing to risk something of his dignity by whispering the small and shouting out the large characters. Two modifications of previously proposed plans, given elsewhere in the *Digest*, will, therefore, be read with interest. A further communication from Mr. Whyte on the logical aspect of his plan is also given. The plan proposed by Mr. G. S. Edmonds, a resumé of which appeared in the February *Digest*, is logical and capable of accurate spoken and written expression.

We would be pleased to hear from our readers on this subject, either by way of comment or with new forms for the revised locomotive nomenclature, of types which we feel is certainly coming in the near future.

Toilet Accommodation for Women in Sleeping Cars

A lady correspondent writes to the *Digest*, calling attention to the necessity for larger dressing room accommodation for women in Pullman cars. She points out that the men have chairs in their compartment and room to turn around, as well as from three to five basins. A woman, she says, cannot comb her hair without striking her arms, elbows or hands against the wall; she cannot shake the creases out of her dress, nor put on her shoes, without either scraping the walls or banging her head against the basin. This lady argues that as the company charges equal fares to both sexes it should provide equal accommodation for both. It is suggested that if the present allowance of room was divided into two compartments, and a larger space allotted to one with two basins, women would not object to dressing two in the same room any more than men do.

It was not long ago that a writer in the *Ladies' Home Journal* scored this company for want of taste in internal decorations. There is, no doubt, much to be said from a lady's standpoint in the matter of dressing room accommodation, which men are apt to leave out of consideration when laying down the plan of a sleeping car. The fault does not, however, belong exclusively to the company named. In fact, the word "Pullman" is often used as a generic term, which includes all sleepers. We commend this matter to the consideration of the officers of the passenger departments of railways, who are usually conspicuous for gallantry where the fair sex is concerned.

Ventilation of Freight Cars

The transportation of farm products, and, indeed, of other perishable merchandise, brings the subject of freight-car ventilation very forcibly to the attention of those interested in such shipments. During the months of summer and fall very wide ranges of temperature are experienced, and it is safe to say that the interior of the closely sealed up box car at such times is usually very hot. In this condition, when moved about, a car is not fully able to take advantage of any cooler outside temperature, which it may encounter in its travels. If loaded and sealed up on a cool day, in moving about it has a tendency to grow hotter inside, though the time taken to reach the objectionable temperature is somewhat longer. The heat inside causes exhalations to rise from the farm products or materials manufactured therefrom. and in the unchanged atmosphere of a closed up box car, the vapor arising from the perishable load is not carried out, and here lies the danger, as condensation ensues, which results in more or less damage to the shipment. A properly ventilated box car has to meet the following conditions. The ventilating device, whatever it may be like, must be one which can be left open all the time, and yet protect the cargo from rain, sparks or dirt, and effectually secure it against theft.

That some such arrangement is required is evidenced by the action of the Grain Dealers' Association, Fruit Shippers, Grocers, etc., and also that of the Department of Agriculture at Washington.

Shippers are entitled to protection against the chance of their property deteriorating while in the hands of a railroad, and by affording such protection a railroad reduces the chance of claims for compensation being made by its shippers. The benefit would be mutual.

"Central-Atlantic" Type Engines

The new passenger engines on the N. Y. C. & H. R., the "Central-Atlantic" type, are fine examples of the excellent work done by the Schenectady Locomotive Works.

They have ample boilers and wide fire-boxes and are said to be free steamers, but the feature which differentiates them from all others of this type is a device for increasing the weight upon the driving wheels as the exigencies of service may demand. "Traction Increaser" is the name given to the mechanism used in shifting a portion of the weight usually borne by the idle wheels at the back, and by the truck wheels in front, and placing it upon the drivers. The equalizer between driving wheel and idler on each side has a long hole for the pivot pin. Two air cylinders attached to brackets, secured to the frames, operate two bell-crank levers, the short arms of which bear upon the top of the equalizers just above the pivot. When air from the main reservoir is admitted to these cylinders their pistons move down and the short arm of each bell-crank assumes a vertical position, and in doing so presses both equalizers down about ¼ of an inch. The equalizers being

pivoted so that the longer end is connected with the springs over the idle wheels, necessarily takes weight off them and puts it upon the drivers. The removal of a portion of the weight upon the idlers tends to allow the back of the engine to sink down, and thereby removes some weight off the engine truck, and transfers it also to the drivers. By "setting" the traction increaser about 4,200 lbs. weight from idle wheels is added to that on the driving wheels, and about 5,600 lbs. borne by the truck, also becomes available as tractive weight. The opening of a stop-cock puts the device in operation, and at the same time continuously blows a warning air whistle while the traction increaser is in use. There is, therefore, no reason why an engineer should have his driving journals run hot by carrying excess of weight at a time when speed has been attained, or when for any other reason the extra tractive force is not required.

The traction increaser is useful, as every one can guess, in climbing a grade. It is stated that by this means these engines have done good work when hauling the Empire State Express up the West Albany hill, a grade about 1¾ miles long, the heaviest portion having a rise of 82 ft. to the mile, or, in other words, a 1.57 per cent. grade. The traction increasing device has rendered a helper engine unnecessary on this grade. It is, however, when starting a train from a station, even on the level, that this device shows its usefulness. When applied for a train length or two it prevents slipping, and thus often obviates the need for the use of sand, which, while assisting an engine to "keep her feet," when used causes the train behind to drag more heavily. The traction increaser when it prevents slipping adds no resistance to the load which it helps to haul. An example of this was given by engine 2982 on train No. 70 on Feb. 18. This train left Poughkeepsie five minutes late, and practically took the place of train No. 10, an express, which should have preceded it, but which was on this occasion far behind. Train 70 has usually four stops to make, for passengers, between Poughkeepsie and New York, while train 10 has eight stops for express matter, and there are two slow downs in the same distance for each train. Train No. 70 had, therefore, to make its own time, which is faster than that of No. 10, to make up the five minutes it was late at Poughkeepsie; to make twice as many stops as usual (stops of longer duration than its own, as express matter only, not passengers, was taken aboard), and haul seven coaches, two of which were Pullmans. The traction increaser is said to have been of great service on this occasion in "getting away from stations."

In hauling the Empire State Express great satisfaction has been given by the Central-Atlantic engines. On Feb. 4 engine 2980, on a very slippery rail, with a delay of fifteen minutes against it, made the run with this train from Albany to New York in 2 hours and 34 minutes actual running time, the schedule allowing 3 hours. On Feb. 5, which was very cold, the same engine again made this run in 2 hours and 34 minutes, with a five minutes delay at Poughkeepsie. On Feb. 9 the run from Hudson to Yonkers was made with train No. 50 (Empire State Express) in 99 minutes, the distance being 100 miles. On Feb. 12 engine 2980 made up 27 minutes with No. 50 between the State Capital and New York. On Feb. 16 this engine left Albany 25 minutes late, made one stop at Ardsley for passengers, and came into New York on time, with one heavy coach more than the regular number on the Empire State Express. On the Mohawk division, on Jan. 25, engine 2979 ran from Syracuse to Utica with ten coaches, and from Utica to Albany with twelve, on the regular schedule time of train No. 36, which is the Atlantic Express.

Such performances place the success of these engines beyond question, and it is safe to predict that some form of traction increaser will become a permanent feature in all future Atlantic type engines. The New York Central can justly claim to be the first road in America to adopt and use this valuable device.

Car Building in 1900

A study of the table given below of cars ordered during the last year of the nineteenth century is interesting. A comparison of the table with a similar one for 1899, published in the January number of the *Railroad Car Journal* for 1900, will be more than interesting—it will be instructive. In both tables the periods of greatest activity were at the beginning and end of the years, though the months in which most work was done are not identical in each case. In 1899 January had the largest number of cars, both passenger and freight, and August and October for freight cars carried the palm in the latter half of the year. In 1900 March is the highest of the earlier months in freight cars, while December outnumbered any month in either year for the ordering of both freight and passenger equipment. The pre-eminence of December, 1900, in this respect is probably due to the country having settled down again to business and prosperity, after having elected as Chief Magistrate a man who has gathered about him what Douglass Story, writing in the New York *Herald*, thinks is "the strongest cabinet since Abraham Lincoln was President." That the prosperity of 1899 has been continued in 1900 is evidenced by the car building records, but the totals of both passenger and freight car orders are, in 1900, slightly below those of the year previous. Had it not been for the extraordinary activity in December the year 1900 would have been very much behind 1899 in car building. This fact verifies the prophecy made in the *Car Journal* in January, 1900, that the car orders of 1900 would be less than those of 1899.

The reason why the early and the closing months of a year seem to be marked with many red letter days in the car builders' calendar supplies a theme for speculation. Activity in the latter half of the year is often due to the regularly recurring car famine experienced during the "grain rush" in the fall. It is estimated that from 80,000 to 100,000 new cars are required annually to supply the wear and tear and necessary increase to meet the demands of a normal condition of business. As a rule, railways do not gradually replace their worn out car equipment as the tissues of a healthy body are renewed. When the pressure of hunger is upon them they usually demand a hearty and rapid meal, and the car builders who cater for them are

RECORD OF CARS ORDERED IN 1900.

FREIGHT SERVICE.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
Box	5,608	4,949	8,185	4,021	3,694	3,150	5,538	1,810	1,928	6,985	6,140	21,693	73,701
Gondola	3,710	1,548	3,035	2,664	4,373	1,075	4,450	1,675	6,850	5,385	10,067	8,610	53,942
Flat	864	380	790	1,049	1,356	150	920	675	585	2,010	508	2,518	11,835
Stock	....	50	130	152	658	....	....	100	20	375	200	300	1,985
Tank	10	....	5	18	5	15	50	30	6	6	50	24	219
Caboose	12	12	3	....	55	....	....	....	....	67	4	....	153
Totals	10,204	6,939	12,148	7,904	10,141	4,390	10,958	4,290	9,389	15,358	16,969	33,145	141,835

PASSENGER SERVICE.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
Baggage and express	....	2	20	10	....	....	....	2	....	....	3	5	42
Com. baggage and pass.	4	3	1	4	....	....	8	....	....	....	....	....	20
Special	....	6	....	....	....	....	....	....	....	....	....	....	6
Dining	5	....	1	1	....	....	7	2	....	....	2	....	18
Parlor	18	....	16	....	....	....	....	....	....	....	....	....	34
Passenger	7	104	141	67	131	21	26	17	22	47	197	634	1,414
Postal	3	....	4	3	....	....	10	2	4	....	11	....	37
Sleeping	4	....	....	....	....	....	....	....	....	....	....	....	4
Totals	41	115	183	85	131	21	51	23	26	47	213	639	1,575

worked to full capacity while the appetite lasts. This state of affairs is due to the fact that it is impossible to accurately forecast the volume of business to be done.

The activity often noticed in the earlier months of a year may be due to the fact that with the new year the balance sheet is clear, the directors' meetings have many of them been held, and the prosperity brought about by a plentiful harvest has given a certain amount of confidence to those who have to provide the "ways and means" for carrying on the business of a road.

THE COMPOUND LOCOMOTIVE

By George L. Fowler

It hath been said by them of olden time that there is nothing new under the sun, and truly the compound locomotive is no contradiction to that statement. Away back in the "thirties" men began to experiment with, and to make failures of, the principle, and continued at frequent intervals so to do for fully fifty years. During this time the practical and conservative element of the railroad community had had it thoroughly instilled into their minds and their prejudices that a successfully operated compound locomotive would be an impossible machine to construct. It is, perhaps, hardly creditable to these hard-headed men to say that they reached these conclusions because of the failures that had been chronicled, rather than from any personal investigation and analysis of the causes contributing to the failure, or from any true comprehension of the conditions that must be fulfilled in a successful compound locomotive. Repeated failure to them meant impossibility of achievement, utterly unmindful of the fact that the whole fabric of modern mechanism rests upon a foundation of discouragement and failure. Regrettable as it may be, it is not too much to say that the same spirit and the same fear or unwillingness to acknowledge that any good can come out of Nazareth is still a potent influence in obstructing the introduction of what progressive men consider the most important improvement in locomotive construction since the application of the steam blast and the invention of the link motion.

Fortunately, all men were not of the same mind or swayed by the same influences, and it is to the credit of European engineers that the way was opened for the development of the successful compound locomotive. In the early eighties the movement began in Germany and England. Continental engineers, for whom a complication of machinery has no terrors, and who are trained in a careful analysis of cause and effect, turned their attention to the probable possibilities of effecting a saving of coal by the application of the compound principle to locomotive construction. An analysis of this principle convinced them of the possibilities of a practical application, and they set about the achievement of that result.

There is such a wide difference, however, between a mechanical principle and its practical application that there is little wonder that discouragement and failure should have followed close on the heels of their most strenuous endeavors. But, as one difficulty after another was overcome, the soundness of the principle became more and more thoroughly demonstrated, and by 1890 the footing of the compound was firmly established in Germany and France. In fact, the number of compound locomotives in use in Europe at that time fully warrants the assertion that the design had emerged from the experimental stage.

According to Herr August von Borries, the total number of compound locomotives in service and in process of construction on Nov. 1, 1889, was as follows:

Germany	194
England	161
Italy	2
Russia	2
Switzerland	2
South America, India, etc.	199
Tramway locomotives	20
Total	580

This table showed an increase of fifty locomotives in Germany alone during the year, and a total increase from 310 to 580.

A year later (Nov. 1, 1890) the same authority published a similar table, giving the following figures:

Germany	430
England, including engines built for her home roads, South America, India, etc.	523
Italy	2
Russia	32
Switzerland	11
United States	8
Tramway locomotives	28
Total	1,034

Showing that the total number of compound locomotives had risen during the year from 580 to 1,034, of which the progressive railroad men of the United States were responsible for eight.

It was but natural that the American railroad man, or, to place the credit where it really belongs, the American locomotive builder, should have come to the conclusion that there was something in a machine of which nearly a thousand examples were running on the railroads of Europe, and he imagined he saw an increased market for his wares in the application of the principle to American locomotives.

It followed as a matter of course that the special devices by which the European compound locomotive had been made a success had been patented in this country. Overtures were, therefore, made to the patentees for the right to use these American patents, but the exaggerated idea of their value held by their owners was at once a prohibition on their adoption. The royalties demanded were so excessive that the total expense of construction of far more complicated devices was much less. In fact, the royalty paid on some of the patents in England was more than the present difference in the selling price of the heaviest types of simple and compound locomotives of the same power.

Under these circumstances it was no more than might have been expected that American engineers should have resorted to their own ingenuity to "get around" the patents. Then their troubles began. They were obliged to work out their own salvation with a handicap that the foreigners did not have. In England, Germany and France the work of developing the compound locomotive was done by men like von Borries, Worsdell, Webb, Sawyer and Bosquet, who were themselves in charge of the motive power of the railroads. The experimental locomotive was, therefore, exploited under their own immediate supervision. It could be coddled and watched. Its weak points could be detected and remedied as soon as they appeared, and the whole structure developed along the lines of a rapid and healthy growth. In the United States, on the other hand, the development was in the hands of a builder whose every statement was taken with a whole spoonful of salt. The engineers, master mechanics, superintendents of motive power and general managers were, as a class, filled with a deep-rooted disbelief in the soundness of the principle, and when they could not substantiate that disbelief they fell back on a cock-sure certainty of the impossibility of its practical application to locomotive work.

By cajolery, pleading, personal influence and by assuming total responsibility for failure, together with the manifestation of a willingness to give the railroad officials due credit for any success that might be achieved, a few engines were built and run. Of course they were, in many cases, disappointments. The designers were not always men equal to the task that they had assumed. Engines of faulty design were foisted and forced upon unwilling roads, until the whole system received the blackest of black eyes, and build-

ers who were working on correct principles and accomplishing satisfactory results were given the cold shoulder by railroad men who had had sad experience with the work of incompetent designers.

Meanwhile the Master Mechanics' Association was discussing the subject. On the floor there was a love feast and a paean of praise for the compound. On the piazza there was condemnation—not to say damnation. And it is a melancholy fact that the piazza sentiment holds a dominant influence over many a railroad management to-day. Reports of an undue coal saving were rightly attributed to an improperly worked or working simple engine, and discredit thus thrown on even the most reliable of comparisons.

So the struggle has been going on for ten years. Engines have not always been bought in accordance with the best judgment and recommendation of the head of the mechanical department, but at the dictation of an official having a controlling influence in the policy of the road, and yet himself controlled by influences that were outside the domain of applied mechanics. The order was given and duly regretted. Engines were built, to be quickly folowed by the wish that they had not been built; and then came the ill-founded opinion that all compounds were a delusion and a snare.

Fortunately, the evil influences have not been the only ones at work. Correct designs, based on correct principles, have been put into service. They have demonstrated that coal can be saved at the rate of from 17 to 25 per cent., according to the service that the engine is called upon to perform. Repairs have been found to be no more than in the simple engine, and, indeed, are usually less. And the men on the road have learned that disaster is not always riding at the front end of the compound. With these shining examples before them, and with the persistent manufacturers forever dinning the results into their ears, the skeptical manager, who has to keep a wary eye on expenses, is beginning to think that, possibly, there may be something in the thing, after all, and he orders one for trial.

It has been a hard struggle, discouraging and disheartening in the indifference of the men who should have been most interested, but the rewards are beginning to appear. Orders are placed for large numbers of engines in a block, without a demand for a guarantee of efficiency and expense of maintenance; managers who formerly met the salesman with a peremptory "No," now dismiss him with a request for a written proposition and a promise to consider. The memory of old aches and pains, sorrows, calamities and breakdowns is being softened by time, and the compound locomotive has ceased to be the bugaboo of the shop and the road. In short, the sentiment of the piazza has come to be more in harmony with the sentiment of the floor, and the men who have borne the heat and burden of the day have now a prospect of the general actual acceptance in railroad circles, in the near future, of the economy, adaptability and intrinsic value of the compound locomotive.

BOILER EXPLOSIONS

By Roger Atkinson, Formerly Superintendent of Rolling Stock, Canadian Pacific Railway.

Owing to a number of boiler explosions having taken place recently there has been a revival of the usual discussion as to the cause of them. Possibly this may be because the explosions have taken place, not in remote country districts or backwoods saw mills, but in the largest centres of population, where engineers, boilermakers and all classes of mechanics who are familiar with such plant, form a considerable portion of the population. An impression appears to exist in the minds of some people that these explosions arise, in some cases, from mysterious causes, such as the formation of unknown gases, etc.; and, while there is no sound reason for such ideas, there is no doubt that a few of these explosions are extremely difficult to account for, but that appears principally to be because the conditions have not been known, and also because, in some cases, the residue has not been thoroughly inspected by an experienced expert before possible traces of the cause have been destroyed. The establishment of boiler insurance companies, and the institution of regular inspection by competent inspectors, has, no doubt, done away with much of this false reasoning, but there are many who still hold such peculiar views.

The cause of boiler explosions can be analyzed only by critically examining the system of building and maintaining the boilers. Their failures may be divided into two large groups, viz., external and internal, and into two other groups, locomotive and stationary boilers (marine boilers being generally included in the latter). External failures are caused principally either by weakness of seams, defective work or corrosion—any of these being developed by expansion and contraction, especially in externally fired boilers, such as the ordinary multitubular type. This type of boiler is usually constructed with single riveted, circular seams, on account of the tendency of the plate and rivets to be burned away in a double riveted seam. This is due to the extra width of doubled plate not being so well protected by the water. As the boiler is hotter at the bottom than at the top the expansion tends to lift the boiler at the ends and to depress it in the centre. Any weakness in these seams may develop into a split through the rivet holes, especially if there has been any bad practice in building, such as drifting the rivet holes. The tubes themselves add materially to the strength, longitudinally, by supporting the heads. The writer had, on one occasion, to investigate and repair a locomotive boiler which had for some months given considerable trouble by leaking at the under side of the barrel; and, on cutting out the plate, it was found that the circular seam, which was single riveted, had cracked through the plate from rivet to rivet until the crack extended 3 ft. 6 in. around the barrel; there was, therefore, almost nothing but the tubes to hold the boiler from exploding.

Failure by tearing the plate longitudinally is most frequent, and is generally due to lap joints. The method generally practiced in bending plates to form lap joints is perhaps the most unmechanical piece of work in boiler-making. The plate is rolled to a circular form as far as it can be held in the rolls, and the tangential portion at the end which forms the lap, and which is, when in use, the most subject to the destructive effect of expansion and contraction, is then bent on a block with hammers to the approximate radius required. If the boiler is being made with punched holes, the holes are put in the plate before bending, which causes local weakness; and, when this portion is being bent, it is hammered into a series of waves, or lumps and depressions, like the crossing of two tides. It cannot be a surprise to any one that any surface cracks, or other defects produced by punching, are thereby developed into causes of failure, and at the same time it is absurd to expect that good tight joints can be produced by such a crude method of manufacture, as the water is provided with conduits all through the joint right out to the caulking edge. The caulking is only watertight because a thin wedge of metal (which is part of the edge of the overlapping plate) is forced in so as to spring the lap up against the head of the rivet, thus further tending to open the joint. The plate itself upon which the caulking edge is being driven is also frequently grooved and damaged by careless or excessive caulking to such an extent that cracks are afterward produced by expansion, etc. The above comments hold good with regard to the making of a butt joint, though to a less extent; but the effects of expansion, etc., do not have such a detrimental result on account of the plate being practically a true circle. The ordinary system of forming lap joints is to make the portion which forms the lap follow about the same curvature as the boiler plate, as in Fig. 1, which, under strain, assumes a form in which the plates are more nearly circular, as shown in Fig. 2, and which lifts the overlapping edge off the body of the plate

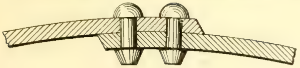


FIG. 1.

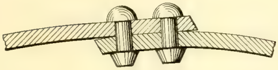


FIG. 2.

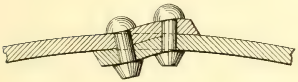


FIG. 3.

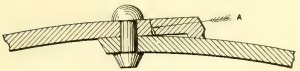


FIG. 4.

at a point just outside the head of the rivet, thus causing leakage, and bending the plate, causing it to crack (if it is not good plate) exactly in the spot marked A, shown in the sketch taken from "Modern Machinery," and given in the *Digest*, Jan., 1901, p. 30.

The natural form of such joint at rest should be as in Fig. 3, where the line of plate is a continuous circle. The writer has seen cases in which a similar crack was formed upward in the lap plate, as shown in Fig. 4, by excessive caulking. There are occasional cases of defective work in the rolling of boiler plates with rolls which are too light for the plate, whereby the plate is stretched at the edge to a circle larger than the body of the plate; and, in forming the circular seam, the edge has to be compressed by hammering, in which process it is, of course, damaged to some extent, but seldom so as to become a cause of explosion. It does, however, cause the plate to crack out to the edge, and thereby, eventually, entails patching.

It is extremely rare to find any cases of boilers which are set in brickwork being stripped for examination and test, although all boilers so set are very liable to corrosion of the outer shell, due to contact with the bricks, especially if there is any leakage.

In internally fired flue boilers, such as the Cornish and Lancashire, it is usually found that explosions take place more frequently by failure of the inside rather than of the outside shell; and, generally, they are in some way connected with shortage of water, which caused the crown of the firebox to drop as soon as it got sufficiently hot, and when any admission of feed water is practically certain to be followed by an explosion. The cause of this will be discussed later.

The first case of such failure ever seen by the writer occurred many years ago in a Cornish boiler, in which the crown dropped, but the boiler was saved by the engineer being in time to prevent the fireman starting the feed water and by immediately pulling out the fire.

The use of black oil for scale prevention is condemned because it causes a black scale to form on top of the sheet, which seems to obstruct the passage of heat from the plate to the water, thus causing the plate to get overheated and to drop, as if short of water.

It is frequently asked what becomes of the water that was in a boiler prior to the explosion, as there is never any found on the ground about the scene. In the writer's opinion, this may be accounted for in the following manner. The water in a boiler at, say, 90 lbs. pressure contains a surplus of specific heat over what it has at the boiling point, 212° F., sufficient to convert about one-eighth of the water into steam. This heat, if our conception of the vibratory theory is correct, is keeping all the molecules in motion and tending to separate them from each other. At the instant the pressure is removed there must be a tendency for all the molecules to spring apart and form a vapor. This tendency is accelerated by the force of the explosion and the flying portions of the boiler. This vapor, being scattered in the air, and being hot, will certainly be largely absorbed by the atmosphere, if not altogether, and in any case such moisture as may reach the ground in the vicinity will be little more than dew, and will be instantly re-evaporated by the hot debris.

In boilers of the locomotive type, and in combustion furnaces of the marine (Scotch) type, the failure of stays is the most frequent cause of explosion; and, in some of these cases, it is a great source of speculation as to why stays break or pull out, which are calculated to carry safely higher pressures than exist at the time of failure. It is generally believed if a firebox crown is allowed to become bare by shortage of water, so that the plate may become very hot, possibly red hot, that such portion of the surface water as is high enough to touch the plate assumes the spheroidal form and is not actually in contact with the hot plate. When the feed is again started and some colder water put in, together with a raising of the water level, it causes the spheroidal condition to disappear by yielding to the increased pressure of the height of water, and simultaneously cooling; and the contact of the water with the red hot plate evolves such a great amount of steam, and produces such a consequent rise in pressure, that the boiler staying is unequal to the strain, and explosion follows. That this action does take place is debated by others, as it can be shown that it is not possible for the plate to contain sufficient heat to develop enough steam to cause a noticeable rise in pressure, as shown by the gauge, which is undoubtedly true. The assertion, however, that explosions caused by admission of feed water into a boiler under these conditions do take place, appears to be incontestable; but why it is so has been the cause of much discussion. As mentioned at the commencement of this article, it is attributed by some to the formation of an explosive gas, but there is no good foundation for this theory. In the first place, there are no gases present but the hydrogen and oxygen of the water, and the boiler plates do not emit gas. In the second place, gases do not appear to explode during the process of separation, but may explode when brought together in bulk, if ignited they will unite with much force. If the hydrogen and oxygen of the water or steam were by any possibility dissociated by contact with the hot plate they would disseminate throughout the steam as fast as formed, and there would be nothing to ignite them again. A theory which the writer has considered favorably is that of *local* explosion, causing the first damage to stays, etc., followed by their consequent failure under the pressure carried. It is conceivable that if the water has assumed the spheroidal condition, and is then caused by addition of feed water to come into contact with a red hot plate again, that there would be, undoubtedly, a sudden local formation of a bulk of steam with explosive force. If we may draw a parallel and take an idea from the comparative explosion of black gunpowder and dynamite, we know that, when exploded on the ground, the powder does not make so large a hole in the ground for an equivalent amount of explosive as the dynamite does. Or, if placed upon an iron plate, supported by the corners, the powder may explode with little apparent effect, while the dynamite will form a cup shaped depression, as the inertia of the plate does not give it time to vibrate bodily. The popular way of putting it is that dynamite is generally considered to "blow down" with more force than black powder. This idea has no foundation, and is entirely opposed to that law of mechanics which says that "all internal forces are equal and opposite," so that we have to conclude that the dynamite had some support, resistance or backing to enable it to drive downward with greater visible effect. The only support that both explosives have, however, under these conditions, is the

pressure of the atmosphere, so we can only conclude that the greater effect produced by the dynamite is developed by the greater speed of its explosion, using the inertia of the air as a resistance. In other words, the dynamite, in proportion to powder, blows as much larger a hole in the atmosphere as it does in the ground. This view is borne out by the greater distance at which destruction to trees, etc., takes place. Next, suppose we could double the atmospheric pressure, would it not be reasonable to suppose that the force distributed in making a hole in the ground would be doubled, while the effect on the atmosphere would be only half as great. If this point is conceded, we have then to consider what the effect would be if the atmosphere was at a pressure of, say, 180 lbs., or equal to boiler pressure, that is, 13 atmospheres above vacuum. Under these conditions a local explosive formation of steam from water in the spheroidal condition being forced into contact with a hot plate would have the support of 13 atmospheres of pressure to give it force to destroy the staying by either breaking the bolts or pulling them out, and thus form an area of weakened surface large enough to cause the explosion to be continued by the pressure to the destruction of the boiler; and it would leave no evidence to show where the one explosion left off and the other began. What kind of a commotion would take place in the boiler steam we can only form an indefinite conception of, but it would not, in any probability, affect any other portion of the boiler, not being close enough to any other part to produce a sudden strain upon it.

There is no doubt that if a local explosion, such as above suggested, were caused experimentally with an electrically fired charge, that the explosion of the boiler would follow; but the unknown factor is whether it would require a much less charge to cause failure of the staying when the boiler or vessel under experiment is carrying a high pressure.

It is, perhaps, a doubtful question whether the water at the sides of the firebox far below the water level and near the fire can be caused to assume the spheroidal condition locally by an intense flame playing upon a particular part of the plate. There can be but little doubt that, with certain classes of water (e. g. alkali water), it is possible to form steam faster than the circulation will remove it. The writer has seen plates apparently "mud burned" which had no scale whatever on them, and never could have had under the conditions. If, therefore, the water can be driven off so that the plate can become overheated it is possible for the water to assume the spheroidal state, which, if left to itself, would gradually disappear when the cause was removed by cooling from the edges, but if the water was partly cooled rather suddenly the conditions are changed sufficiently to consider whether local explosion is not possible.

[In connection with the foregoing article the reader is referred to the account of the explosion on the Great Western Railway at Westerfield, England, Jan. *Digest*, p. 19.——"The Lap Joint," "Recent Boiler Explosions," and the "C. & N. W. R. R. Boiler Explosion," Feb. *Digest*, pp. 67 and 68. Also "Rivet Holes," "Boiler Explosions in France," "The Board of Trade Finding on the Westerfield Case," and "A Real Low-Water Explosion," in this issue of the *Digest*—Eds. *Railroad Digest*.]

The Two Cylinder Compound

Editors Railroad Digest:

I read with pleasure the extract from the Railroad Gazette entitled "Progress of the Two Cylinder Compound During the Past Ten Years" in your valuable paper, and find it to be correct, except in one particular. This refers to the application of the by-pass valves, which has been misprinted. It reads as though the suction from the smoke-box to the low pressure cylinder was created by the application of these valves. This suction existed, of course, in a considerably larger degree before the application of the by-pass valves, together with the other evils enumerated in the article, though not mentioned among them.

It is plain that the by-pass could not create this suction, but was a remedy, "though not entirely sufficient to obviate the suction from the exhaust passages when the engine is "drifting" at high speed, and in an early cut-off position of the links.

The remedies obtained by the application of the by-pass valves, while drifting, are as follows:

1st. Thumping. 2d. "Logishness." 3rd. Rough riding.

4th. Fanning of the fire, with an abnormal fuel consumption and steam generation when not needed, or resulting in leaking tubes by the admission of cold air through the fire door.

5th. The suction of cinders, soot and smoke-box gases into the cylinder, with consequent drying and destruction of the lubrication and wear, and cutting of cylinder and piston.

The last objection not being entirely obviated; and, as it was found desirable to admit a limited amount of fresh air to the cylinders to prevent overheating of the air under circulation, a slight draft on the fire was reintroduced. The exhaust relief valve will allow the required fresh air to be admitted without its fanning effect on the fire, and more completely remove the suction of the smoke-box gases to the cylinder.

I desire to call your attention to these points in case you should feel inclined to refer to them on any future occasion, and it is gratifying to add that we obtained the most satisfactory result with our compound locomotives by the application of these simple contrivances, including the double ported valve.

C. J. MELLIN,

Chief Engineer Richmond Locomotive Works.

Creaking Cars

A correspondent interested in the matter has offered a possible explanation of why many passenger coaches creak a good deal when being hauled in a train. It is, briefly, that in winter they are constantly overheated. The liability to overheating when in service is not so great as when standing in yard, because in the former case, the grumbling of passengers would apply an automatic, even if indirect check, upon the amount of heat supplied. It is when the car is standing in a yard, between trips, that it is probably overheated, and this causes the woodwork to shrink, and, to a certain extent, may also explain the deterioration of the interior decoration of the car moldings, and panels gaping at the joints. A creaking sleeping car is very unpleasant to travel in, and, though the occupants may prevail upon the porter to regulate the heat, they know he is powerless to lessen the noise which sets every one's teeth on edge. Such a car may have stood all day, closed up, perhaps locked, with heat supplied from a yard steam pipe. In order to render constant attention unnecessary a good head of steam is probably turned on, and perhaps a temperature of from 90 to 100 degs. is maintained. At night the car is ready to go out on its run, loose in its joints and with a greatly increased nerve-racking ability. The Powers Regulator Company says that by experiment it has found that a car having their automatic temperature controlling apparatus came out remarkably well in an experiment. A car was left all night attached to a yard heating plant, and in the morning it was ready for service with a temperature of 71 degs., and the condensation drip from this car was 200 pounds of water less than a car standing next to it, which was not supplied with any heat regulator. The car which used the most water had, when ready for service, the oppressive temperature of 90 degs. The net results appear to be by the use of a heat regulator the maintenance of a regular and by no means excessive temperature, which does not crack joints in the wood work; as a secondary advantage it thereby preserves the patrons of the road from the tortures of creaking cars; less damage is done to the interior ornamentation, and, lastly, a saving in the amount of steam used to produce the necessary heat is effected by producing only the necessary temperature in the car, which latter everybody knows is a saving of hard cash for the railroad company concerned.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Re-Rolling Worn Rails

Iron Trade Review, Feb. 7, 1901, p. 11.

The proposition to renew steel rails by restoring the balance of section disturbed by wear has been developed beyond the experimental stage. Early in carrying out the process other benefits have been found. Re-rolling made the entire section contribute to the replacement of the metal lost by wear. Re-rolling was found to add to the wearing qualities of the old rail, so treated. This effect was produced by the more thorough working of the metal and to the low temperature at which the rails are given their finishing passes. The knowledge thus obtained has been turned to account in the manufacture of new rails. A rail therefore need not be scapped when worn, because it is of comparatively light section. It can be re-rolled and used again, with but slight loss in weight per yard. The reduction of weight varies from 6 to 10 per cent., according to the condition of the rail when offered for treatment. A rail can be reproduced to perfect section of slightly less weight per yard. With this in view, the removal of rails from the track for re-rolling is no more an indication that the rails have outlived their usefulness than the shopping of a locomotive for general repairs indicates the end of its career. It would, then, be good judgment to remove rails a year or two earlier than is now done. By this method the cost of re-rolling would be less, the reduction in section will be less, consequently a greater portion of metal would be retained for a longer period in the position subject to the greatest wear. Not the least attractive feature of the whole plan is the fact that nowhere in the five or six rail lives which it secures, does the price of billets enter as a disturbing element. Altogether it is one of the most attractive propositions ever offered to railway managements.

The Gokteik Viaduct

Engineering News, Feb. 28, 1901, p. 147.

The Gokteik Viaduct, "on the road to Mandalay," is one of the most notable bridge structures erected by American bridge builders in foreign countries since the construction of the great Hawkesbury bridge in Australia in 1889. The viaduct crosses a deep, wide gorge on the Rangoon-Mandalay line of the Burmah Railway. Its length is 2,260 ft., and has in it 4,852 tons of metal. The Pecos viaduct, in Texas, approaches nearest it in length, and the Kinzua viaduct in weight. The consulting engineers of the Burmah Railway, Sir Alexander Rendel & Co. of London, awarded the contract for this bridge to Pennsylvania Steel Co. of Steelton, Pa.

The bridge consists of fourteen single towers, one double tower and a rocker bent, which, with the abutments, carry ten 120-ft. truss spans and seven 60-ft. plate girder spans. In plan the viaduct for 281 ft. at one end and 341 ft. at the other end is curved to a radius of 800 ft., and between these two curves there is a tangent of 1,638 ft. The height of the structure above the ground is 130 ft. at one end, 320 ft. at the highest point and 213 ft. at the other end. The viaduct was designed to carry a double track of one m. (3.28 ft.) gauge and a footwalk, but the floor system for the footwalk and one track only is constructed at present.

Perhaps the most interesting parts of the work were the methods of preparing the material for shipment, and erection by unskilled workmen, far from any adequate base of supplies.

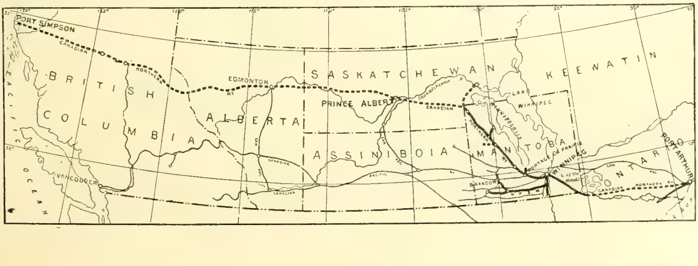
Before leaving the shop the various members were painted in various colors and combinations of colors, which enabled the men in charge of erection, by means of a suitable key drawing, to locate by its color the position of each member in the structure. All material was delivered at track grade at one end of the structure, and erected from that point by means of a traveler. The Engineering News devotes a full double page inset to the illustration of the viaduct, giving four good half-tones, a diagram elevation and details of tower construction.

Proposed Canadian Transcontinental Line

Railway Age, Feb. 22, 1901, p. 136.

A map shows the proposed route of the Canadian Northern Railway, the new enterprise which is in Canada becoming a factor in national and provincial politics, and threatening competition with the Canadian Pacific.

The Canadian Northern is intended to extend from Port Arthur, Ontario, on Lake Superior, west and northwest by way of Winnipeg, Portage la Prairie and Gladstone to



Prince Albert, on the Great Saskatchewan River, a distance of nearly 1,000 miles, and thence on through Edmonton and the Yellowhead Pass to the Pacific, probably at Port Simpson, near the northern line of British Columbia. Several hundred miles of branches are proposed or already completed, including the 354 miles of lines in Southern Manitoba just acquired through the Manitoban government.

On the portion of the main line now under construction the distances and conditions are about as follows: From Port Arthur to Winnipeg, 264 miles of track laid and 175 to be laid. From Winnipeg to Prince Albert, 370 miles laid and 176 miles yet to be laid, making a total of 634 miles laid and 351 to be laid, the grand total being 985 miles between Port Arthur and Prince Albert.

From Port Arthur west, track has been laid 109 miles and from Winnipeg east 155 miles. The gap of 175 miles is to be covered and the road put in operation by October next. The Canadian Northern will be the successor of the Port Arthur, Duluth & Western, Ontario & Rainy River, Manitoba & Minnesota (covering the 44 miles in the State of Minnesota) and Manitoba & Southeastern. These lines are being built by Mackenzie, Mann & Co., as contractors, but the Manitoban government has guaranteed the bonds on a large part of the distance and the road will be virtually a government road.

West of Winnipeg the Canadian Northern has a land grant of from 6,400 acres to 12,800 acres per mile, making a total of 2,455,466 acres, and in Manitoba the bonds are guaranteed by the provincial government, principal and interest, at the rate of $8,000 per mile, which may be increased to $10,000. The new road runs through much country well adapted to farming and grazing, and its construction is expected to greatly stimulate immigration, as well as to reduce rates on the transportation of products to Lake Superior for eastern shipment. The policy of the Manitoban government appears to be to give low freight rates even if the operation of the road is thereby made unprofitable.

Against White Signal Lights

Railway and Locomotive Engineering, February, 1901, p. 77.

It is reported that the Legislative Board of the Brotherhood of Locomotive Engineers for Indiana has taken action on the question of the white light as the safety color in switch lights, and with interlocking signal and switch systems. Their objection takes the form of an amendment to the statute. Several serious accidents have taken place by reason of colored glass lenses having been broken out of switch lights, whereby a white light was shown to an approaching train on a switch wrongly set. Many progressive roads are getting ready to eliminate the fixed white light from the code. The yellow light is being substituted in the code, and a rearrangement of colored signals, in regard to their meanings, will soon come into general use.

Locomotive Equipment, Appliances, and Related Matters

Locomotive Classification

Railroad Gazette, Feb. 1, 1901, p. 71.

Mr. C. Lewis, writing to the Gazette regarding the plan proposed by "Roadmaster," which appeared in the Gazette Dec. 7, and that of "Superintendent" on Dec. 28, says that while both methods are good, the one which uses the small and capital letters is objectionable, because it cannot be easily enunciated. One combination (that for English single driver, with small leading and trailing wheel) would have to be spoken thus: Small A, capital A, small A. Mr. Lewis suggests a combination of two methods already suggested. He would indicate small wheels by figures and drivers by letters; the type referred to above would be, then, 1—A—1, the "Atlantic" type 2—B—1, and so on through the entire series.

"Roadmaster" also writes, defending his plan and replying to "Superintendent." He says that it is not essential to show the difference in the size of wheels either in figures or in speech, and thinks the end would be defeated if letters were used to show the number of leading, driving or trailing wheels. The English single driver is represented as $_1$, 1, $_1$, and when spoken would be eleven, one. The "American" type is $_2$, 2. When spoken is twenty-two. The "Atlantic" type is $_2$, 2, $_1$. When spoken is twenty-two, one.

[This abandonment of size of figures, as here shown, makes this system almost identical with that proposed by Mr. Whyte, except that it considers the number of wheels on one side only, while Mr. Whyte's plan includes all the wheels under an engine, and the latter uses three digits in every case.—Eds. Railroad Digest.]

Logical Locomotive Classification

American Engineer and Railroad Journal, Feb., 1901, p. 55.

Mr. F. M. Whyte, mechanical engineer of the N. Y. C. & H. R. R. R., writes to the Engineer on the scheme of locomotive classification proposed by himself. He thinks the time opportune for the adoption of some system of type designation by wheel arrangement, as that is the prominent feature in nearly all the types in use to-day. As three sets of wheels are generally used, and as they are likely to be for some time to come, Mr. Whyte thinks a three-figure expression is very satisfactory. It is clear and accurate and would do away with the nuisance of such technical words as Mogul by the general public. Such words as "Northwestern," "Central-Atlantic," "Chautauqua," and those which require some subsidiary explanation to people not familiar with their specific meanings. By this method the "American" type would be a 4-4-0, a ten-wheeler would be a 4-6-0, the Mogul a 2-6-0, the Atlantic, together with the Northwestern, Central-Atlantic and Chautauqua, would be a 4-4-2, a six-wheeled switcher a 0-6-0, and a four-wheeled switcher a 0-4-0 type. He points out again, that in this system the first figure must always be taken to mean the leading wheel of the engine, no matter how shown on a drawing. Mr. Whyte thinks the acceptance of this system might be secured by use in the technical press, and the stamp of approval by the Master Mechanics' Association and Railway Clubs, would tend to make it official.

A Study in Locomotive Fireboxes

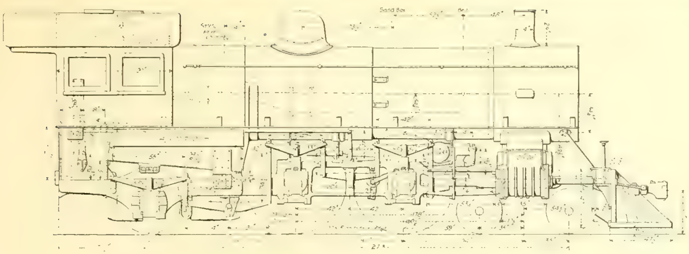
American Engineer and Railroad Journal, February, 1901, p. 55.

Mr. G. F. Starbuck writes to the Engineer under the above heading. He calls attention to "the article by Mr. F. F. Gains, which appeared in the Engineer for December, 1900 (Digest, January, 1901), on this subject. Mr. Starbuck says: "Measurements of 'radial-stay' boilers when pressure is applied indicate that many fireboxes do change their shapes, to the injury of the joints, staybolts and tube sheets." The writer indicates that the desirable "curve of rest" for firebox plates is obtained when the sectional area between the inner and outer firebox sheets is a maximum. To find when this condition obtains, any two adjacent stays and the portions of the plates between them may be considered. When laid out on a drawing board stays and plates form a quadrilateral figure. The area reaches a maximum when it can be inscribed in a circle. If all the quadrilaterals so made can be inscribed in circles the "curve of rest" will have been drawn; but this is not necessarily a part of a circle. It is also noted that the Belpaire boiler, whose sheets are not curves at all in the general acceptation of the term, fulfil these conditions, and therefore its plates conform to the theoretical curve of rest. The curve of rest is a portion of a circle when there is an evenly distributed fluid pressure acting alone. In a boiler there is always this evenly distributed pressure, but all the stay-bolts are pulling on the sheets with forces that are not equal and in directions which are not all radial, and this fact produces curves of rest other than the circle.

New Class I, Central Atlantic Type N. Y. C. & H. R.

Railroad Gazette, Feb. 1, 1901, p. 73.

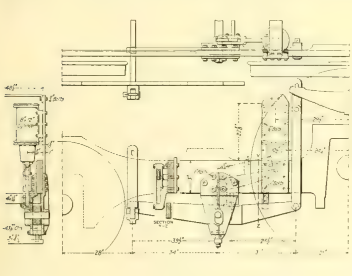
This engine is the latest step in the development of the Empire State Express locomotives. The old class I engines have now become class C, and the new Central-Atlantic



type locomotives have become the present class I. The latter class will soon supersede the old American type engines in the work of hauling the Empire State Express, to which another coach will probably be added. The new design has received strong endorsement by motive power men of other railroads having engines built at Schenectady. Since the first of these engines came out there have been two requests to have pending orders for passenger locomotives changed to conform to this design. Two other companies have asked that an option for such change be given them, one for passenger and the other for freight engines.

The new passenger locomotives were designed by Mr. A. M. Waitt and his staff, in consultation with Mr. J. E. Sague, mechanical engineer of the Schenectady Locomotive Works.

The engine is remarkable for its great amount of heating



surface and the relation of the grate area thereto. In this respect it is second only, by 300 sq. ft., to Pittsburg, Bessemer & Lake Erie consolidations, which are the largest locomotives in the world. The Central-Atlantic's heating surface is 3,505 sq. ft. The relations of grate area, heating surface and cylinder volume have been given careful attention, and the traction increasing device (described in our editorial columns) gives to these locomotives a distinct individuality in the United States.

The driving wheels have steel centres and are 79 in. in diameter over tires. Driving boxes are cast steel. The frames are wrought iron, finishing in plates at the rear, as illustrated; the trailing wheels, which are 50 in. in diameter, run between the plates, with outside journals. The trailing axles are not radial, but there is some play in the pedestals. The trailing journals are 8 x 14 in., the driving journals 9½ x 12 in., and engine truck 6¼ x 10 in. The main crank pin is 6½ x 7 in., and the cylinders are 21 x 26 in., stroke. The total weight of engine in working order is 176,000 lbs., of which about 95,000 is normally on the drivers, 42,600 on the engine truck and 38,400 lbs. on the trailing wheels. When the adjustable fulcrum is shifted to put about 10,000 lbs. additional weight on the drivers the weight distribution then becomes 104,800 lbs. on drivers, 37,000 lbs. on engine truck and 34,200 lbs. on trailing wheels. The normal traction is, estimated at 85 per cent. of the 200 lbs. working steam pressure, and based on adhesive weight, 23,725 lbs. It is calculated that with the traction increasing device in action the tractive effort is increased to 25,350 lbs.

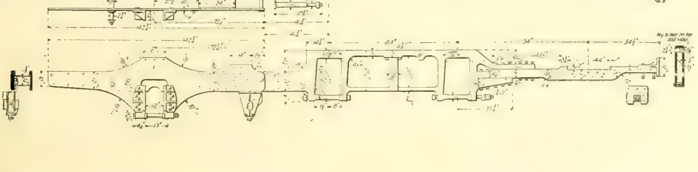
The valves are 12-in. pistons, with inside admission. They have 1 in. steam lap, ⅛ in. exhaust clearance, and are set line and line in full gear for both motions, the greatest travel being 6 in.

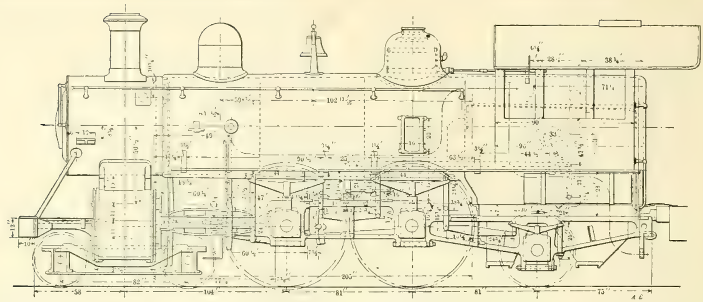
SPECIAL EQUIPMENT.

Type of tender truck	Fox pressed steel, bolster type
Bell ringer	Sansom
Front and back couplers	Gould Coupler Co.
Safety valves	Three consolidation 2½-in., muffled
Steam heat equipment	Consolidated Car Heating Co.
Reducing valves	Mason
Sanding devices	Leach
Injectors	Nathan Mfg. Co. (Monitor No. 11)
Driver brake equipment	Westinghouse-American
Tender brake equipment	Westinghouse-American
Air pump	Westinghouse 9½ in.
Air signal	Westinghouse
Headlight	Dressel 16 in., round case

Lagging—Franklin sectional lagging on boiler and cylinders; boiler head lagged; removable section over stay bolts.

[It may be mentioned that in these locomotives the engine truck is braked, and also the idle wheels at the back. In service, therefore, every wheel from pilot to marker flag will contribute its quota to the stopping power of the train. —Eds. Railroad Digest.]

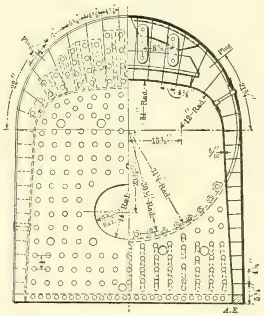




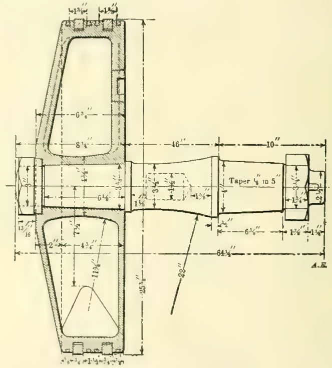
Compound "Atlantic" Type Engine

American Engineer, Feb. 1901, p. 46.

"The adoption of the wide firebox for burning soft coal by the Baltimore & Ohio is interesting from the fact that this road has had a long and extensive experience with large grate areas for hard coal. This design is particularly noteworthy also because of the combination of wide grates and compound cylinders with the 'Atlantic' type of wheel arrangement. It should prove altogether favorable, and reports indicate that the expectations are being realized. With a total weight of not quite 150,000 lbs. the total heating surface is 2,663 sq. ft., which is almost the same as that of the 10-wheel locomotives of the Great Northern Railway built in 1898, which weigh 166,000 lbs. The Baltimore & Ohio engine has more heating surface for its weight than any design of this type of which we have record, and this indicates a successful effort to save weight elsewhere in order to increase the boiler capacity. The engravings illustrate the elevation and transverse section of firebox, the low-pressure piston and hollow piston rod." The engines were built at the Baldwin Locomotive Works, Philadelphia, Pa.



Transverse Section of Firebox.



Low Pressure Piston and Hollow Piston Rod.

Compound "Atlantic Type" Passenger Locomotive—Baltimore & Ohio Railroad.

Eight-Coupled Goods Engine—Japan

Engineer (London), Feb. 8, 1901, p. 138.

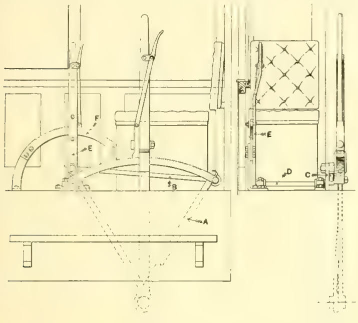
This locomotive, built by Mr. R. F. Trevithick, locomotive superintendent of the Japan Government Railways, is shown in a large-sized cut. It is one of two, and their completion brings up the total to seventeen built at the Kobe work shops. The last two engines have hand and vacuum brakes and in addition a counter pressure brake. The air inlet valves, usually placed on the steam chests, for the admission of air to the cylinders while the engine is running down hill, shut off, are in these engines placed on the smoke box, near the top on each side and are connected with the T-pipe in the smoke box, a position which lessens the risk of dirt being drawn into the cylinders, and where the valves themselves are out of the way. The muffler or valve for controlling the exit of steam and water from the cylinders is placed at the back of the chimney, and the inlet valve casing is on the right side conveniently used as a valve box for the muffler valve—this construction being for the purpose of compactness. The muffler valve is operated from the footplate. To operate the counter pressure brake the directions given are as follows: (1) Open muffler valve a little, (2) place blast pipe valve so as to prevent cylinders drawing air from smoke box, (3) open water injection, (4) reverse engine. The injection water is drawn from side tanks and delivered into exhaust cavities of the cylinders at about the level of the port faces, and the indraught carries it into either end of the cylinders, whence it is forced up the steam pipes to the muffler in the form of very wet steam. The more fully the valve gear is reversed, and the more nearly the muffler valve is closed, the greater the back pressure in the cylinders and the greater the retarding effect upon long, heavy down grades.

The Allfree Cut-Off Adjuster

Railway Age, Feb. 1, 1901, p. 91.

The engraving herewith illustrates a simple and effective device which gives the engineer complete control over the cut-off by making it not only possible but absolutely safe and easy to make such adjustments as are necessary to secure the greatest economy, together with the maximum performance of work. In order to make time and save steam, frequent notching of the reverse lever is necessary, but owing to the present difficulties attending this operation, the engineer only resorts to an adjustment under extreme necessity.

This adjuster may be applied to any type of locomotive. The main quadrant is usually carried by the fork A pivoted upon the hub of the reverse lever or carried by supporting



guides attached to the running board. Through the link B the quadrant is adjustably connected to the arm C on the rocker-shaft D, to the opposite end of which the cut-off lever E is firmly secured. The adjuster quadrant F is graduated so that practically one notch equals one-fifth of one notch of the main quadrant, and the operation is so simple that the engineer will familiarize himself with it in a few minutes.

It is found, too, that the device affords a most excellent means of detecting either dry eccentrics or valves, simply by unlatching the cut-off lever and holding it by the hand for an instant; any slight derangement will be instantly detected.

This device is manufactured and sold by the Locomotive Appliance Company, 1504 Fisher Building, Chicago.

Two-Cylinder Compound Locomotive—Northeastern Railway of Switzerland

Genie Civil, Feb. 2, 1901.

This engine is of the two-cylinder type, carried on eight wheels, of which four are coupled. Its peculiarities of construction are, first, that both cylinders are between the frames. Their respective diameters are 18.11 in. and 26.77 in. A second point to attract attention is the fact that the boiler has no dome, which, by the way, is in accordance with the regular practice on the Northwestern Ry. The dry-pipe is provided, on its upper surface, with longitudinal openings, and leads into the smoke box at the usual place, where it opens into the throttle box. The throttle valve itself is horizontal and its stem runs back through the dry pipe and out through a stuffing box at the rear end of the same. The dry pipe ends beneath a manhole located near the center of the boiler at a point where the dome would ordinarily be placed. The safety valves are on this manhole plate. Starting is accomplished by means of a two-seated valve by which live steam may be admitted directly into the receiver, and the exhaust from the two cylinders be separated when the cut-off is later than 70 per cent. of the stroke.

Two-Cylinder Compound Locomotive at the Paris Exposition

Revue Generale des Chemins de Fer, Jan., 1901.

The Southern Railway of France exhibits a two-cylinder compound locomotive of the mongul type, in which the cylinders are outside the frames and set between the truck wheels and the front driving wheel. The high-pressure cylinder, with a diameter of 17.7 in., is on the right-hand side, and the low-pressure, whose diameter is 26.68 in., is on the left. The common stroke is 25.59 in. The ratio of the high to the low-pressure cylinder is as 1 to 2.28. These engines are said to be a modification of an old type with an overhanging fire-box carrying a steam pressure of only 123 lbs., whereas they now carry 209 lbs.

Serve tubes are used and a copper fire-box. The total heating surface of the boiler is 1,820 sq. ft. The total weight in working order is 117,040 lbs., of which 91,300 is upon the driving wheels.

The starting mechanism of these compound locomotives is one that was first used on the Southern Railway. It consists of a small auxiliary throttle by the movement of which the engineer permits live steam, that has previously been admitted to the high-pressure steam chest, into two openings that are uncovered simultaneously. One, whose diameter is about 1 3-16 in., leads into the high-pressure cylinder at the center of its length. The other, whose diameter is about 0.4 in., communicates with the receiver. The throttle is placed in a box attached to the high-pressure cylinder and in communication with its steam chest on the one hand and with the cylinder itself and the receiver by the passages cast within the walls. It may be added that the relief valves constitute, in themselves, a starting apparatus which renders the use of the auxiliary throttle superfluous in the majority of cases.

The valve mechanism is of the Stephenson link type. There is, however, a difference in the adjustment of the two sides. This difference is to be found in the eccentricity and angular advance of the two eccentrics, as well as in the lap of the valves. These elements have been so adjusted that the corresponding points of cut-off are as follows.

High-pressure.	Low-pressure.
30 per cent.	43.5 per cent.
40 " "	54.5 " "
50 " "	63.5 " "
60 " "	72.5 " "
79 " "	81.0 " "
75 " "	84.5 " "

The maximum speed that has been attained by these engines is 62 miles an hour on a level with a train of 130 gross tons.

Hot Eccentrics

Railway and Locomotive Engineering, February, 1901, p. 73.

In the correspondence department of Locomotive Engineering Mr. Thos. P. Whelan tells why eccentrics which run cool on an engine doing heavy fast service will sometimes run hot when the same engine is running light. He takes two definite cases. One an engine having 160 lbs. steam pressure, full throttle, pulling six cars at 50 miles per hour. The other, a similar engine, at same speed, pulling one car or running light. In the first case it is assumed that the reverse lever would be in the 7 in. notch. This would use sufficient steam to make the pressure on top of the valve somewhat less than that of the boiler. The comparatively wide opening for admission gives fairly high percentage of boiler pressure in the cylinder, and a correspondingly high expansion pressure. This latter tends to lift the valve, and in thus counteracting the pressure upon the top of the valve reduces friction between valve and seat, which in turn makes lighter work for the eccentrics. With engine running light the case is different. The cutoff is assumed to be not more than 3 inches. To supply the small amount of steam which could here enter the cylinders through the narrow opening made by the valve the pressure in the steam chest, and of course on top of the valve, would be nearer that contained in the boiler than it was in the other case. The lower cylinder pressure, due to this contracted port opening, would cause the pressure during expansion to be very

weak, and its upward effort on the valve would be inconsiderable. It therefore follows that in this latter case the friction between valve and seat is greater than in the former case, and consequently more work is put upon the eccentrics. In the matter of lubrication, the first engine, having longer valve travel, there is a greater portion of valve seat exposed for lubrication than in the second. We have, then, first, less friction and better lubrication; and in the second, more friction and less lubrication; with the corresponding reaction, in each case, upon the eccentrics.

Four-Cylinder Compound Locomotives at the Paris Exposition

Revue Generale des Chemins de Fer, Jan., 1901.

There were two four-cylinder compound locomotives exhibited by the Southern Railway of France at the Paris Exposition. One was an eight-wheeled engine with four wheels coupled and intended for express passenger service. The high-pressure cylinders are outside the frame between the truck and the forward axle. They are horizontal and drive the rear wheels, whose axle is located beneath the fire-box. The low-pressure cylinders are between the frames and beneath the smoke box. They are also horizontal and drive the forward axle. The boiler carries a steam pressure of 205 lbs. The total heating surface is 1,842 sq. ft. The fire-box is of copper and contains a brick arch. The Belpaire type of fire-box is used. The Serve tubes are set with copper ferrules at the fire-box end. The exhaust is variable with two valves.

The high-pressure cylinders have a diameter of 13.78 in., the low are 21.65 in. and the common stroke is 25.2 in. The ratio of volumes of the two sets of cylinders is as 1 to 2.47. The high-pressure cranks are at right angles to each other, as are also the low. But the latter are so set that they are nearly opposite the high, and thus serve to maintain a balance of the reciprocating parts. The angular difference between the two cranks on the same side of the engine is 162°. The Walschaert valve gear is used for both cylinders. The driving wheels are 68 in. in diameter.

The engine with six wheels coupled is of the ten-wheeled type and is intended for service on the line between Toulouse and Bayonne, where there are a number of 1½ per cent. grades and one of 3.2 per cent. having a length of about seven miles. These engines have hauled trains of 125 gross tons up the latter grade at a speed of 18.6 miles per hour and of 160 tons up the 1½ per cent. grade at a speed of 34 miles per hour. The maximum authorized speed is 62 miles miles per hour and is frequently attained.

The driving wheels have a diameter of 68.9 inches. The cylinders are of the same dimensions as those already noted. The boiler has a heating surface of 1900 sq. ft. The weight in working order is 132,220 lbs., of which 97,460 lbs. is upon the driving wheels. In the case of the engine with four wheels coupled the weight in working order is 126,500 lbs., of which 91,740 lbs. is upon the driving wheels.

Hungarian Locomotives at the Paris Exposition

Revue Generale des Chemins de Fer, Jan., 1901.

There were three engines exhibited in the Hungarian section of the Vincennes annex of the Paris Exposition. One was intended for express passenger service; the other was of the Mallet type and is used for hauling very heavy trains over undulating sections of the line and the third is for narrow gauge service.

The first is a two-cylinder compound, with cylinders outside the frames, the small one being on the right hand side. The cylinders have diameters of 18.68 in. and 29.5 in. respectively and a common stroke of 26.77 in. The ratio of high to low-pressure cylinders is as 1 to 2.25. The valve motion is of the Walschaert type with valves above the cylinders. The steam distribution in the two cylinders can be connected or independent of each other. To accomplish this object, the lifting shaft of each cylinder is operated by a special lever, and these two levers are, in turn, worked from the foot plate by a reversing screw with an attachment permitting them to be fastened together or left independent. A non-automatic starting valve makes it possible to work the engine either as a single or a compound locomotive. The engine is fitted with a Westinghouse quick-action brake.

This engine is intended to haul a load of 200 gross tons up a 0.7 per cent. grade at a speed of 37 miles per hour. The weight on the driving wheels is 68,400 lbs. The wheel arrangement is in accordance with what is known in this country as the Atlantic type.

The boiler is of peculiar construction in that it has two domes on the shell. The throttle is in the forward dome and, in each, there is a steam separator. There is a direct communication between these two domes, through a large tube connecting them. A variable exhaust is used and the large smoke box is provided with netting on the American plan. The Mallet locomotive possesses no novel features.

The narrow gauge locomotive is carried on eight coupled wheels. In order to facilitate the passage of curves of short radius, the front and rear axles are made radial. The cylinders are outside and the Stephenson link motion is used. The radial motion of the end axles is accomplished by means of the Klien-Lindner arrangement. This consists of keying the wheels to a hollow axle, inside of which is the coupled axle, which is itself fixed in the frame. The coupled axle is attached to the hollow carrying axles by a ball and socket joint that can assume any desired inclination according to the radius of the curve. A strong key insures the turning of the axle. The hollow axle is also given an end play of ½ in. on each side of its normal position, back to which it is forced by springs. In order that the radial action of the two end axles may be uniform, they are connected at their extremities by a series of levers.

This method of concentric radial action is old and was first used in England in 1880 on a small six-coupled locomotive. It has also been used in a modified form in the United States. It seems to serve its purpose very well for small engines but is of doubtful value for those of large size.

A Prime Cause for Flat Wheels

Railway and Locomotive Engineering, February, 1901, p. 76.

The engine is here held to be largely responsible for the flat wheel trouble on cars. Many engines have driver brakes which are not efficient; that is, the brake, though it goes on all right, leaks off before the train stops; and in addition the want of good engine truck brakes makes itself felt. The engine has to be brought to rest by the brakes on the train, or, to use the apt words of the editorial: "Too many engines are playing sinker to the train's fish line each time a stop is made." The engine not stopping itself throws extra work on the train brake, and skidded wheels are often the result. The guilty engine gets off, and all sorts of explanations are made which put the blame on triple valves, incorrect brake leverage and anywhere where it does not rightly belong. A pressure gauge connected to the driver brake, so that a reading might be had at each stop, would have a story to tell. The inspector's report, when made, could be fittingly headed, "Flat wheels Due to Insufficient and Incompetent Engine Brakes."

Boiler Explosions in France

Engineer (London), Feb. 1, 1901, p. 111.

The French Department of Mines watches with much solicitude over the security of steam generators in that country. The precautions taken there are much more severe than those taken in the United Kingdom. No boiler is supposed to be put into service until it has been approved by an engineer of the department, and each boiler has to bear an official mark showing the pressure up to which it can be worked. The boilers have to be inspected periodically and, if advisable, subjected to new tests. Steam users have

formed themselves into the Association Français de Propriétaires d'Appareile à Vapeur, with a view of studying the causes of explosions and taking measures to guard against them in the future. At the Paris Exhibition they had an extremely interesting show of pieces of wrecked boilers, illustrating how the explosions may have occurred and the effect they had upon the generating apparatus.

An inspection of the exhibits showed that the most fertile sources of explosions among stationary boilers, were the external corroding of plates in damp masonry setting, the accumulation of scale, and the bursting of tubes. Bad repairs were also responsible for many accidents through the weakening of the shell by a considerable number of rivets in a small area. Many accidents were obviously due to defective material, but the majority were caused by corrosion and working the boiler at too high a pressure. A number of definite cases are given, and the article concluded with the following summary: Thirteen were due to defective installation, nineteen to want of proper care, and twenty-six to negligence or ignorance, chiefly insufficient water, neglect in cleaning, or scaling, which could easily have been prevented if ordinary precautions had been taken.

The Westerfield Boiler Explosion

The Railway Herald (London), Jan. 26, 1901, p. 13.

Lieutenant-Colonel von Donop's report (to the Board of Trade) on the explosion of the boiler of an engine at Westerfield, on the Great Eastern Railway, on Sept. 25, when the driver and fireman were killed and two people were injured, says that the weakness of the attachments of the inner firebox plate to the stays caused the plate to give way, and thereby led to the explosion. The practice which has recently obtained on the line of depending entirely on the threads of the stays for the attachment between the stays and the firebox plate does not seem to be a satisfactory one. There had been frequent leakages, due to this form of attachment. It is satisfactory to learn, Colonel von Donop observes, that the company has decided to abandon the practice. Colonel von Donop also says that the manner in which boiler repairs are carried out seems to call for greater supervision by the company.

Boiler Explosions

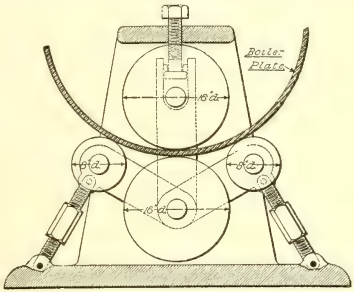
National Engineer, February, 1901, p. 2.

This is a paper read by Mr. F. J. Manney before the Iowa No. 7 National Association of Steam Users. After some preliminary remarks he says:

"Is it not a singular fact that nearly all of the boiler explosions which we obtain accurate description of we find that they let go at the second row of rivet holes on the under lap, and in nine out of ten it is the middle course that is the weak one. There must be some good reason for this. It is not a mystery. It cannot be from some cause unknown. It is not from low water. Nor is it caused by the inaction of the safety valve. Overheating is not the cause, for this seam is above the fire line. Scale is not the cause, for the engineer—worthy of that name—will never allow any of those pieces of carelessness to occur. If he takes the trouble to figure it out he will find that in a 100 h.p. boiler there is enough stored energy at 120 lbs. pressure to send that boiler about five miles high in the air."

Mr. Manney works out the strength of a single and a double lap joint, circumferential and horizontal seams, and then illustrates the application of the U. S. Government rules in a way that any one interested in the subject would do well to examine. He then goes on to consider why does the second row of rivets cause the trouble? He answers this question by saying:

"Because they are punched to full size while the plate is flat. The punch causes little ray fractures around the hole. Then the plates are rolled to the circle of the boiler in the old-fashioned 3-roll rolls. The plate is kinked along the second row of holes, since the first row is so close to the edge of the plate they are out of reach of the top roll. In forcing the rolls together to make the curve in the plate the weakest part goes first and makes a kink along the line of the second row of rivet holes. A very slight skin fracture is liable to occur, and does occur in some cases, which events prove. Those slight skin fractures have a starting point in the little ray fractures made by the punch in the rivet hole. It is only a trifle, but it makes trouble. This kink is to some extent straightened out, but only enough to bring the edges of the plate together for caulking. What remains of the kink is just that much out of a true circle, and when pressure is applied to the boiler it has a tendency to straighten out. When the pressure is off the kink comes back each time. Now, this see-saw working on the fractured plate, no matter how slight the fracture may be, will naturally send the fracture deeper each time. It may take



ROLLS FOR BOILER PLATE.

years, as it did in the case mentioned, to sink that fracture deep enough so that there was only enough good plate left to sustain the pressure carried, or, in other words, that part of the boiler had reached its limit."

The writer suggests a form of rolls, shown in the illustration, and he says:

"After passing through the rolls there would be no weak spot in the plate, since the end row of rivet holes only would be made before rolling, and they being so close to the end they would not be affected. After the plates were rolled they would be set up and lapped by far enough to bring them right to drill the second row of holes with a portable drill. The outside row would be drilled from the inside, and vice versa. Then with a countersink we would take the sharp edge out of each hole so they wouldn't cut the heads off the rivets, and we would have a boiler that would not 'let go' at the second row of rivet holes."

A Real Low Water Explosion

Power, February, 1901, p. 14.

The explosion of a horizontal tubular boiler at Queen City, Marine Railway, Cincinnati, Ohio, on the morning of the 2d of January seems to have been due to low water. This is a cause often indiscriminately employed to explain various boiler explosions. In probably less than one case out of ten is this cause even indirectly responsible. The boiler which exploded was 60 inches in diameter, 16 feet in length, with forty-eight 4-inch tubes. The sheets were 5-16 and heads 7-16 of an inch thick. The plant had been shut down on Saturday and had remained idle until Wednesday, when the explosion occurred. It was exceedingly cold and there is some evidence that the water pipes were frozen. At about 8.30 o'clock the engineer started up the engine, and allowed it to run slowly; the explosion occurred about half an hour later. The fracture occurred in the fire sheet, the metal being drawn out to a thin edge as though overheated, and bulged from internal pressure. The boiler moved backward a few feet from its original setting, turned round end for end, landing not more than 20 feet from its original position, which is conformable with what might have been expected from a low water burst. It is likely that the engineer was deceived as to the water level, for the angle valve in the pipe connecting the top of the water

column to the steam space of the boiler was closed. An inch pipe connected this valve with the top of the water column, and another inch pipe connected the bottom of the water column to the boiler 3 or 4 inches below the lowest tube, and a short distance to the right of the manhole plate. It was the custom of the watchman to fire up, and have steam in the boiler by the time the engineer came on duty in the morning. With the closing up of the angle valve the column and the glass gauge would remain full or nearly full of water so long as the lower connection was covered. This valve was found closed after the explosion, and had probably been closed when the plant was shut down for several days, and not opened when the boiler was fired up. The low water alarm required by the State of Ohio was also rendered inoperative by the same cause, the fact that the lower connection was made so near the bottom of the boiler, keeping the end of the pipe covered, made it possible for the column to stay full of water until the water was very low.

[From all this it is easy to see the value of the rule which is enforced in many railway round houses, of never trusting to the appearance of the water gauge, when lighting up, but in every case, first drawing water from the boiler through one of the gauge cocks.—Eds. Railroad Digest.]

Relative Value of Punched and Drilled Rivet Holes

Science and Industry, Feb., 1901, p. 31.

This paper is by Mr. Barnet Le Van. He says the total strength of a sheet in a riveted seam will be lessened by the area of the metal punched out. From the table given below the fact is deduced that when punching is properly done by machinery correctly designed for that purpose, the punched hole is not only equal to a drilled hole, but is superior to it, in strength of metal surrounding, because in punching sheets in the manner described the metal is made to flow around the edge of the hole, and is thus made more dense and stronger. The results tabulated are the results of experiments by Hoopes and Townsend, of Philadelphia:

Thickness of Bar, in inches.	Thickness Outside of Hole.	Punched Bar broke, in lbs.	Drilled Bar broke in lbs.
3/8 or 0.375	3/8 or 0.375	31,740	28,000
3/8 or 0.375	3/8 or 0.375	31,380	26,950
5/8 or 0.625	1/4 or 0.25	18,820	18,000
5/8 or 0.625	1/4 or 0.25	18,750	17,590
5/8 or 0.625	3/16 or 0.1875	14,590	13,230
5/8 or 0.625	3/16 or 0.1875	15,420	13,750
5/8 or 0.625	1/8 or 0.125	10,670	9,320
5/8 or 0.625	1/8 or 0.125	11,730	9,580

Drilling then weakens the plate more than punching. It is material such as that experimented upon which is ductile enough to flow when punched that should be used in boilers. It is stated that all plates used for boilers by the London and Northwestern Railway of England are punched in a Jacquard machine, then annealed and afterward bent in rolls. The Baldwin Locomotive works' practice is to punch all rivet holes 1-16 of an inch smaller than the finished size and ream them to the driven rivet size when in place. The Baldwin rivets are made in solid dies with a small fillet formed under the head. The writer holds that iron or steel that is not improved by proper punching is not of a fit quality to enter into the construction of steam boilers. His own practice, he tells us, is to have all rivet holes punched 1-16 less than the rivet size up to 15-16 in. diameter, above that size, it varies according to the size of rivet used. A fluted reamer is used to bring the hole to the driven rivet size, after which a slight countersink made in the outside and inside shell plates by a steel die attached to a handle similar to a filler (not cut away by a sharp edged tool). By this process the annular ring around the rivet hole, due to detrusion of the punch, is removed; the metal left between the holes is uninjured and consequently is much stronger than would be the case if the holes had been punched or drilled to full rivet size. The countersinking of the plates filled up by the filleted solid-die rivet adds materially to the strength of the rivet at the weakest point. The driven head entering the countersink also forms a fillet where it joins the stem of the rivet. To the advantages of strength is added only insignificant increase of cost. The cost of the extra work of reaming and making the slight countersink was only $15.00 on a horizontal flue boiler 54 inches in diameter and 17 feet long, built by the Baldwin Locomotive Works of ⅜-inch mild steel, holes punched 1-16-inch less than rivet size, then reamed and countersunk and riveted with filleted rivets made in solid dies. The better made structure secured by this small additional outlay constitutes, from the buyer's standpoint a thoroughly good investment.

Plastic Pressure Tube Expander

Engineering (London), Dec. 21, 1900, p. 798.

A tool for expanding tubes of boilers invented by Dr. C. V. Burton makes use of the plastic property possessed by lead, by which, under pressure, it will flow. The machine, which is made by the Newall Engineering Company, Ltd., of 141 Queen Victoria street, London, E. C., may be briefly described as follows. It consists of a cylinder and piston suitable for hydraulic pressure. The piston has three rods which pass through the head and bear against a bolster. This bolster is pressed against the bead of the tube to be expanded. In the center of the cover, which is the geometric center of the three piston rods, is screwed a mandril, the forward part of which is enlarged, tapering slightly both ways, the enlarged portion being nearly equal to the inside diameter of the tube. To operate the tube expander the piston is pushed back toward the forward end of the cylinder, with the enlarged head of the mandril in the tube, and pushed in far enough to pass beyond that portion gripped by the tube sheet. A lead bush, made in two halves, is inserted in the tube, and lies all round the neck of the mandril. The lead cannot come out, by reason of the fact that the bolster with the three piston rods is placed against the bead of the tube. When it is desired to expand the tube, high pressure water is admitted to the cylinder. The piston and bolster press upon the tube, and the motion of the cylinder over the piston draws the mandril gradually forward out of the tube. The enlarged head suitably tapered, forces the lead bush out in all directions, radially from the center, and so expands the tube on the inside of the tube sheet. As the mandril progresses forward, the lead is placed under great pressure and begins to flow past the mandril head, into the interior of the tube, as a thin circular sheet. This has the effect of expanding the tube into the tube sheet, and of slightly belling the mouth or bead of the tube. When the mandril is pushed in again the lead may be scraped out. By regulating the stroke of the apparatus, the expanding may be confined to that portion of the tube which is held by the tube sheet. The cost of the lead used is simply the difference between the market values of sheet lead and scrap. It is stated that joints so expanded have been tested up to 3,900 lbs. Messrs. John I. Thornycroft & Co. have adopted the tool at their works, and with the approval of the Admiralty are using it on the boilers of four first-class torpedo boats which they are building for the British Government.

Sheet lead of 5 lbs. or 6 lbs. per foot is used for the bushes.

The Application of the Serve Tubes

Glasser's Annalen fuer Gewerbe und Bauwesen, Feb. 15, 1901.

The Serve tubes have now been extensively applied to the express locomotives of the French railways. The outside diameter of the tubes in use runs from 2.55 in. to 2.75 in., with a thickness of wall of 0.10 in. There are usually eight ribs in each tube. Their thickness averages 0.10 in., with a height of from .47 in. to .58 in. The introduction would be even more extensive than it is, were it not for the high price. At the ends of the tubes the ribs are cut away so as to make it possible to expand them into the tube sheets. It has been shown by many experiments that when the tubes are clean their evaporative efficiency is very good. It also appears that the life of the tube sheets is increased by the use of this class of tubes, for the bridge can be made heavier and the plate thicker, on account of the greater diameter of the tubes, so that the holes are not so apt to become distorted by the expanding. On the other hand, it appears that there is no difficulty whatever in keeping the tubes clean, by

means of a jet of steam blown through the interior. Furthermore, it is stated that no trouble is experienced from the choking up of the tubes. Fifteen minutes is usually quite sufficient to clean a nest of tubes.

The first application of the Serve tubes was made on the Mediterranean line in 1889. They have now been adopted on nearly all of the French roads for express locomotives. The advantage gained lies in the fact that there is a very great increase of heating surface without any appreciable addition to the weight of the locomotive. In fact, the French engineers reckon the whole surface of the ribs as so much additional heating surface. While the heating surface of the ribs may not be equal to that of the smooth tubes, yet the dividing of the current of gases and the added temperature gained thereby is quite sufficient to make up the difference.

Self-Acting Plugs for Burst Tubes

Modern Machinery, February, 1901, p. 61.

A practical test has been made of a plan suggested by Mr. Ravier, an engineer in the French Navy, for using self-acting plugs for burst tubes in water-tube boilers. On the head of a slender stalk, from two to three times as long as the bore of the tubes, is placed a hemispherical plug made of iron, steel or gun metal, coated with lead in order to make a watertight joint when in use. The stalk is inserted in the mouth of each tube, while the plug remains outside in the "header;" with a horizontal rod behind it to prevent its falling out of the tube. When a tube bursts the rush of water into the tube from each end carries the plugs up hard against the orifices, and the pressure keeps them there. In sectional boilers, where the tubes are arranged in separate series, it may suffice to put them at each end of every series only, instead of at every tube. The arrangement has been tried successfully in a torpedo boat, in which the bursting of a tube produced no inconvenience, the boat continuing its voyage. It was able to put to sea the next day without repair, the burst tube being effectually plugged at both ends by these self-acting bungs. The weight and shape of the plugs are so proportioned as to prevent any risk of their accidentally blocking the tube ends in the regular working of the boiler.

The Locomotive and the Horse

Express Gazette, January, 1901, p. 9.

During the year ending June, 1899, there were employed on the steam railroads of the United States 928,924 persons, or just about one-eightieth of the total population of the whole country. It is interesting to ascertain the average amount of transportation which each man effected.

During the year there were moved the equivalent of 14,591,000,000 passengers and 123,667,000,000 tons of freight a distance of one mile, which shows that the work done by each employe was equal to the moving of 15,708 passengers one mile and 133,130 tons of freight one mile—equivalent to each man moving one passenger and 8.5 tons of freight forty-three miles each day of the year.

The work of this nature in the transportation of freight has improved 29 per cent. since 1894 and 15 per cent. in the last two years. Compared with the work that can be done by one man and a team of horses, an idea may be formed as to the gain that has been made in the last hundred years by the use of railroads in bettering the methods of transportation.

The Cost Question of High-Speed Trains

Engineering Magazine, February, 1901, p. 885.

This is an article by Mr. Rous-Martin, in which, though he touches upon the question as to whether "high-speed involves increased consumption of fuel," he does not answer it definitely. Increased speed, he tells us, is only one of at least three elements which have to be taken into account, and its influence upon the whole question is absolutely relative to the proportional prominence of the other elements. These three elements, we may suppose, are speed, load hauled and roadbed over which speed is made and load hauled. The entire question is an open one. In the matter of whether high speeds pay, there is much more definite information given. Speed is really the raison d'etre for railways. The most noticeable part played by high speed as an advertising factor was shown in "The Race to Aberdeen" in 1895, as the fast runs from London to the Scottish highlands was usually called. Many people who had never taken their holiday in Scotland because of the long, tiresome journey took the trip when they found advertised London to Aberdeen by the West Coast route in 8 hrs. 40 min., and 8 hrs. 32 min. by the East Coast route. Perth in 7 hrs. 15 min. and Edinburgh in 6 hrs. 19 min. The writer tells us he has known of fourteen heavy expresses leaving a certain station in London in one evening, with but four shown on the time table, so great was the demand for accommodation. The Atlantic City "flyer," with its phenomenally high average speed of 66.6 miles per hour, is not only the fastest train in America, but is the fastest in the world, making its 55½ miles in 50 minutes. This train was put on and its high speed maintained purely as a paying business speculation. The Chemin de Fer du Nord in France also runs high speed trains, and pays its fortunate directors dividends of from 15 to 17 per cent. The "express goods" and the "important express goods" trains in Great Britain, running at passenger speed, are mentioned to show that a railway's ability to get merchandise over the road and out of the way rapidly is an important factor in its dividend-earning capacity.

The "Atlantic" type engine used on the Atlantic City fliers, the express engine for fast passenger service on the Caledonia Railway and one of the engines of the Chemin de Fer du Nord are shown in three beautifully executed half-tones.

Car Equipment, Appliances and Related Matters

Cast Iron Wheels for Heavy Coal Cars

American Engineer and Railroad Journal, February, 1901, p. 51.

Present experience with coal and ore cars of large capacity points to the fact that the cast iron wheel for such cars has reached the limit. Two alternatives are, however, suggested. Either the form of wheel must be changed or the flanges must be relieved in some way. The breakage of wheels, and particularly of flanges, under 50-ton cars has of late caused a good deal of anxiety. Fifty-ton cars may give way to 40-ton cars as a possible solution of the problem, but the reluctance of the managing department to give up the advantages of hauling 50-ton loads, now that they have tasted of them, will likely stand in the way of such a retrograde step. The heavy car has come to stay, and the problem is more within the province of the engineer and designer on railways than in that of the car builder only. In other words, wheels must be produced which will satisfactorily carry the 50-ton car. Cast iron wheels for these cars have been strengthened at the hub to withstand a wheel-press pressure of 110 tons upon a mandrel, and they have in one case been increased in weight up to 690 lbs. for the purposes of overcoming breakage of plates; but flange breakage is not so easy to stop. The opinion of those most competent to judge in such matters is that with present standard contour the limit of strength of flanges has been reached. It is suggested by the American Engineer that perhaps ⅛ in. more metal in thickness of flange might be sufficient. The steel-tired wheel is the other alternative. The editorial writer says that several broken flanges coming under notice had blue fractures, showing the influence of brakes on mountain grades. The trouble is widespread, and the near approach of 75 tons of car and load brings up new factors in the matter of wheels. The general use of rigid trucks, it is thought, may have some bearing on flange breakage, and the return to swing motion trucks for such

weights seems a reasonable one. The swing motion truck, we are told, would undoubtedly serve to reduce the shocks which rigid trucks must bring upon wheel flanges.

[Locomotive Engineering had an article in its December, 1900, issue, p. 522, on "Freight cars have reached the safe limit of weight," in which reference to flange failures is made. See Digest for January, 1901, p. 29.—Eds. Railroad Digest.]

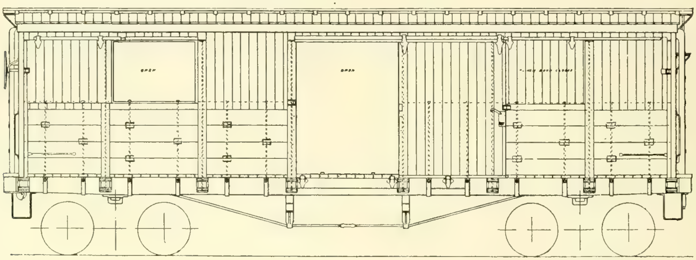
The "Handy" Freight Car

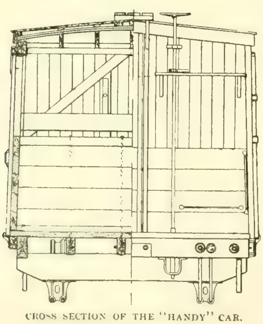
Railway Age, Feb. 1, 1901, p. 86.

The "Handy" freight car is a patented design handled by Mr. Chas. L. Sullivan, 1425 Old Colony Building, Chicago. It is a sort of combination box and gondola car. Any standard style of underframing may be used and any style of roof is applicable, and any form of car construction may be followed, from the belt-rail up. The corner posts are angles and the side and end posts are tees or angles. The posts are secured to the side and end sills by fastenings resembling stake pockets, and the tops of the posts and the ends of the carlines are secured to the plates by malleable iron brackets. The sides below the belt rail are boards 2¼ or 2½ in. in thickness, running parallel to the side sills, as in a gondola.

There is the regulation full-sized door in the centre of the car and the sides are made in panels fitting between adjacent side posts. A gain in internal space is secured in two ways. First, by the fact that the lost space inclosed between outside and inside sheathing in an ordinary box car is here available, as the horizontal boards make the one and only wall of the car below the belt rail. Second, a batter of from 4 to 6 in. is given to the sides of the car, giving greater width at the floor line than is admissible at the roof on account of clearance limitations. Two auxiliary doors on each side are provided above the belt rail, which are made to close flush and lock automatically, and therefore do not require seals. The gondola form of construction adds strength to the framework, and the other details are worked out in a thorough and satisfactory manner.

Some of the claims made for this car are increased capacity without the additional expense which would result in a similar increase in an ordinarily constructed box car; short lengths of material used in the sides lessen first cost and repair charges. It is also thought that the use of this style of car will reduce empty return haulage, because it can be used for many purposes for which box and gondola cars are now separately employed.





CROSS SECTION OF THE "HANDY" CAR.

Passenger Car for Express Service on Southern Railway of France

Revue Generale des Chemins de Fer, Jan., 1901.

This car is carried on four wheels and has a total length of 45 ft. 9 in. over the end sills and a wheel base of 29 ft. 6 in. The interior arrangement consists of a series of six first-class compartments and a toilet room, arranged along one side of the car with a corridor along the other. There are, however, no end doors, but access is gained through side doors in the usual manner. The frames are, of course, of metal.

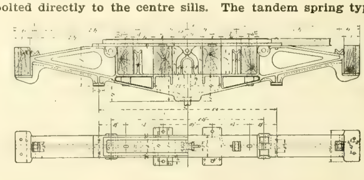
Electric lighting is used, but the amount supplied cannot give a very brilliant illumination. There are 12 lamps in all, two in each end compartment and one in each of the others; three in the corridor and one in the closet. The candle power of each lamp is eight. Steam heat from the locomotive is used.

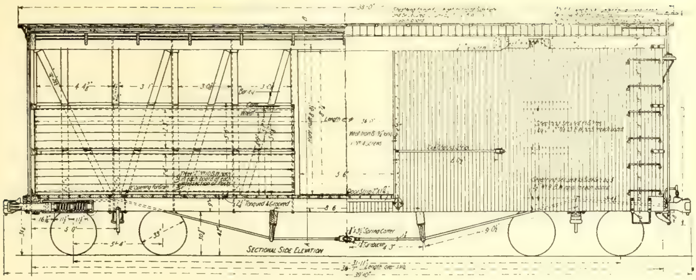
The cars weigh 42,240 lbs. exclusive of the accumulator and dynamo and have a seating capacity for 38 passengers.

Northern Pacific Box Car 70,000 lbs. Capacity

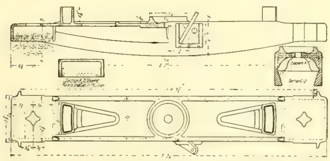
Railway and Engineering Review, Feb. 23, 1901, p. 100.

A 36-ft. box car of 70,000 lbs. capacity is fully illustrated by the Review. The car is built by the American Car and Foundry Co. of St. Louis, Mo., which is building a lot of 2,750. The side elevation shows one important feature, viz., the underframing, which is of wood, is carried so low that draw timbers are dispensed with. The draw bar stops are bolted directly to the centre sills. The tandem spring type



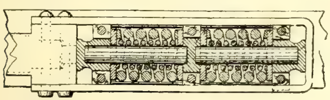


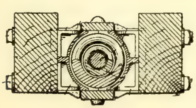
of draw rig is used. As the draw bar stop bolts pass through the centre sills the intermediate sills are bored so as to permit of the insertion and removal of these bolts. The details of this draft box, which has just been patented by Mr. Edward Passon of St. Paul, in conjunction with Mr. Alfred Lovel, superintendent of motive power, Northern Pacific, are shown in the illustration. Probably the chief point of interest in connection with this underframing lies in the cast steel body bolsters used, a view of which is also shown. This is the American Car and Foundry Co.'s type of cast steel body bolster slightly modified for this lot of


-Cast Steel Truck Bolster.

cars. The bolster consists of two members, the lower being the bolster proper, but having a tie placed across the top after the centre and intermediate sills have been mounted. The several advantages of this style of bolster are then set forth in some detail. The bolster weighs 700 lbs. The needle-beams are inclined with regard to their sill connections. The body framing is of the usual type, and the roofing is of the Winslow construction. The car body sets lower than usual, this being assisted in by placing the intermediate sills quite near the centre sills, so that there will be no interference with the intermediate sills by the wheels. A cast steel truck bolster is used which weighs 663 lbs. The truck is built with low vertical dimensions to suit the low carried car body. The ends of the bolster ride on modified Barber rolls.

"A point to be remembered in this connection is that the oak block which provides a seat for the top roller plate acts also as a very efficient spring dampener—the advantages of which have been brought out in recent railway club discussions."



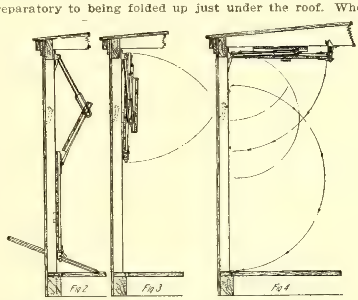


[In this article reference is made to a preceding issue of the Review, Feb. 16, p. 86, in which a new 100,000-lb. hopper coal car for the Northern Pacific was built by the same firm. The centre sills in that car are 12-in. channels, but the notable feature of placing the pull and thrust of the draw gear on the centre line of the sills has been adhered to in that car, as in this.—Eds. Railroad Digest.]

Improved Grain Door

Railway and Engineering Review, Feb. 9, 1901, p. 75.

A novel grain door for freight cars has been designed by Mr. Chas. Linstrom, master mechanic of the Yazoo & Mississippi Valley R. R., and has been patented by him with a view of placing it upon the market. Fig. 2 shows the door being pried up with a bar, and Fig. 3 represents it fully up, preparatory to being folded up just under the roof. When



the door is in use it is held securely in place by corner thimbles, which fit into sockets in the floor, while in its raised position it is caught by slotted hooks so placed as to hold the door over against the posts. There are two pockets at the lower edge, protected by flaps, which permit the insertion of a bar to raise the door up enough to allow the grain to start running. The door can be handled by one man.

Consider the Day Coach Passenger

Railway and Engineering Review, Feb. 2, 1901, p. 65.

The passenger in the day coach should be considered. Why more attention is not given to him does not appear, for day coach traffic constitutes a very large volume on all lines. The day passenger resents the appearance of being forced back into the sleeper in order to avoid being herded like cattle. That the old sleeper does not meet all the requirements of other than smoking car patronage is shown

by the success of the Alton Limited, which, although a daylight limited, offers an indication of what is desirable on all through trains. In the matter of equipment, two closets is only a matter of common decency, and accommodation for washing should be provided. Where it is provided it is often doubly annoying to find it useless through the absence of towels and soap, and for this some one is responsible. A smoking compartment is a good thing, because it has a tendency to prevent a passenger who wishes to smoke holding two seats—one in the smoker and one in the day coach.

Badly arranged layover points for crews, or the dividing up of through runs between several crews, necessitates the repetition of ticket examination, which is not only a needless but is often a positive nuisance. Also, a well trained crew does not call out the stations; they keep track of the passengers and quietly notify each at his or her proper station, without annoyance to the other occupants of the car. In the matter of meals another improvement could be made. Many people do not feel like paying one dollar for each single meal. At large division points a man who generally goes out, unfamiliar with the station, has often to risk losing his train before he can find a lunch counter, frequently not conveniently placed. The suggestion is made that a responsible official should make a 24 or 36 hours' trip over a line where he was not known, and use an ordinary ticket on the journey, and while traveling look critically for points of possible improvement from the viewpoint of a large number of patrons of his own line.

Electric Equipment, Machinery and Appliances

Automatic Train Indicator

Western Electrician, Feb. 23, 1901, p. 126.

An annunciator or signaling device has been installed on the Northwestern elevated railroad in Chicago to notify patrons of the approach of trains. About 1,000 ft. from each station is placed a trip, which is operated by the flange of the car wheel striking it in passing over the track. The trip closes a circuit connected to the return rails on the structure and to the station. A connection with the third rail is made at the station, and in the circuit on the wall of the waiting room are placed five incandescent lamps in series and a gong. The closing of the circuit by the train rings the bell and lights the lamps, giving ample time for passengers to mount to the platform before the train arrives.

The Coming Train Light

Railway Journal, February, 1901, p. 14.

The present standard of railway service demonstrates the disposition of railway managements to get the best of everything that tends to increase the comfort of their patrons and enhance the magnificence of the passenger equipments. At the last International Railway Congress, held in Paris last fall, the subject of train lighting came up for a share of the discussion. Two exhaustive reports were submitted on car lighting, one by M. Chaperon, engineer and chief of division of the Paris, Lyons & Mediterranean, and the other by Cajetan Banovitis, ministerial councillor and director of rolling stock and locomotives of the Hungarian state railways. M. Chaperon says:

"Electric lighting is, without contradiction, that which is presented under the most attractive form. Incandescent electric lamps have, in fact, an incontestable superiority over all the other methods of lighting, as much from the point of view of comfort as that of facility of installation of luminous centres, which may be as intense as desired, and which can be placed at the most convenient points for the passengers. They produce no, or next to no, heat, and there is no occasion to provide for the products of combustion being carried outside. The electric lighting of the carriages produced by means of a dynamo driven by the axle during the run of the train realizes, in principle, a complete and rational system of lighting."

M. Banovits sizes up the situation as follows: "Of all the modes of lighting trains, that which seems to us to best answer to the conditions of a perfect light is electric lighting, for, besides offering the greatest security against the danger of fire, it possesses a proper luminous intensity, assures a light, clean, fixed, exempt from atmospheric influences, and permits a simple and economical dimming for the night. Everything, in short, invites to the belief that from the pecuniary point of view this method of lighting will permit more favorable economical results than have hitherto been attained; and it may pertinently be remarked that the advantages which other methods of lighting may appear to present over the electric lighting are largely offset by the superiority of safety conditions and by the other inherent advantages of the method."

Electricity on the Railway

Electric Review, Feb. 2, 1901, p. 153.

Among the important uses to which electricity is put on railways may be mentioned signalling, the movement of switches, the lighting of signals and switches, telegraphing and the electric lighting of trains. The first mentioned have reached a point of considerable perfection, but in the lighting of trains with electricity this country has been very slow indeed. The lighting of a single passenger car with gas under the best and most economical systems now in vogue amounts to several hundred dollars per annum. It has been demonstrated that cars may be lighted electrically at less cost for maintenance of the systems and supplies consumed than in any other way that has been attempted. Electricity is said to be cheaper than kerosene oil, and is much more satisfactory.

The car stove was rightly considered dangerous in its day. It is time, the Review thinks, for enlightened public opinion to begin an agitation similar to that which resulted in the disappearance of the car stove, against the highly dangerous lighting systems now employed by some railways. In all the oil and gas lighting systems naked flames are used, while there is necessarily carried on the car a reservoir of inflammable liquids or gases. To insure, as far as may be, the safety of the passengers, requires that every variety of flame-making and inflamable substance should be rigidly excluded from cars which may at some time be wrecked. If the car-stove was bad, certainly the car gas tank or oil lamp is no better. The electric light is said to be cheaper; it is safer and it gives much satisfaction to patrons of the road using it. The experience of those roads using electricity for lighting has been highly satisfactory.

Safety Third Rail System

Railway World, Feb. 2, 1901, p. 116.

The following description of the system, as installed in the Baltimore Belt tunnel, is given by Captain Murphy:

The rails are charged in the following manner: The motorman opening the electric controller to the first notch automatically communicates with the air tank carried on the locomotive as a storage reservoir for compressed air, which operates the brakes. This compressed-air tank immediately gives the power to the air engines, which in turn operate an electric generator having current sufficient to pick up a switch, and charges the third rail with current from the power-house. That instant this current passes from the switch to the third rail, to the shoe, to the electric generator which lifted the switch; that immediately and automatically becomes a motor, which, through the substitution of two valves in the air engine, also becomes a compressor and charges the air tanks from which it originally got its motive power. Thus at no time during the operation of a car over this system is it possible to have a charged conductor or third rail except when the motorman has opened the controller. Hence, should a person even fall beneath a car and the motorman quickly throw the con-

troller closed, there would not be the slightest danger from injury by electricity. There is no possibility of the third rail in front or rear of the car while the car is in motion becoming charged.

Electric Traction in Great Britain

American Machinist, Jan. 17, 1901, p. 53.

Two years ago the "tramway" business promised a large volume of business in Great Britain. The municipal authorities are, however, responsible for the fact that this promise has not been fully realized. Legislation, too, has militated against the speedy growth of the industry. The promoters were practically ordered to sell out in 25 years for what amounted to an old iron price, and, with that goal ahead of them, they were not likely to have a very valuable property on their hands when the time came to dispose of it. The light railways act, together with the advent of electricity, improved the situation somewhat, but the municipal authorities have fastened upon the industry. They object to others constructing and operating tramways, and as English boroughs are usually of limited area, and as they can only work within their own boundaries, the result is that only in large cities like Manchester or Glasgow do we find any attempt at an extensive system. Interurban traffic has not flourished, because as the municipalities take possession of the best locations, private capital will not seek the unremunerative field. Tramway development in England should be carried out in a broad-minded manner; that country is one of the best possible fields for such enterprise; yet now engineers are complaining that they cannot get remunerative employment on electrical traction work. The old tramway industry was fettered by legislation; the present is grasped by municipal control. The suggestion is made that under the circumstances control should be placed in the hands of the county instead of those of the borough. Better still, if the whole country was divided into districts and placed under a board of management which would work the tramways in a commercial manner at low profits but not at absurdly low rates. In such a system the fact that an outlying branch did not pay ought not to be held to justify its stoppage. It is because of poor facilities being afforded them that the back districts do not prosper as they should. The large prospective amount of trade which might be done by American firms in English traction work makes the matter one of importance in this country.

In America the other extreme has been reached, that of allowing "private enterprise" to have its own way in these matters. It is, however, possible to safeguard public rights without following on English lines.

Does the Electric Current Kill?

N. Schellinger, an electrician of Chicago, in the presence of a number of persons interested in the progress of science, shocked a cat apparently to death, and when the heart of the feline had long ceased to beat, Mr. Schellinger reversed the current of electricity and the shock restored the heart beats, although they were very feeble at first. Within two hours after the cat had been pronounced dead it had been restored to the fulness of life and vigor and was as playful as ever. Electrician Schellinger says there is no doubt in his mind that any person who has seemingly been killed by an electric shock can be restored, if intelligent action be followed on the lines adopted by him in this case, and if the victim can receive such attention within a few minutes after the accident.

Electric Railways Affect the Telephone

Tramway and Railway World (London), Jan. 10, 1901, p. 37.

An experiment has lately been made at Bale with a view to minimise the inconvenience caused by the effect of the electric current conveyed by the overhead trolley system to the tramways. It is well known that should a telephone line run parallel with that of a tramway served by the overhead system, a considerable noise, which seriously affects the telephone, results from the passing of the tramcars. The tests made at Bale have demonstrated that the only perfect solution for the difficulty is to insulate completely the telephone line by establishing a return wire for the current, instead of allowing it to return by the ground. Such an improvement would undoubtedly require large expenditure, but, as electric tramways will greatly increase in number, it is the only practical remedy. In Switzerland the telephone system is conducted by a single line, and the change would involve an outlay of no less than twenty millions of francs (£800,000), which would have to be spent in order to provide a double line for that country.

Conducting Transportation

Canadian Pacific Method of Tonnage Rating

Proceedings of New York Railroad Club, Jan. 17, 1901, p. 7.

Mr. Thomas Tait, manager of the Canadian Pacific Lines East of Fort William, read a paper before this club, which was entitled "A New Method of Rating and Loading Engines in Freight Service." The fundamental principle upon which this system is based is that the haulage capacity of engines should be based on the uniform proportion of tare weight to gross weight. An engine hauling a given number of tons gross weight is doing more paying work for the company in proportion as the weight of car contents is high and that of tare, or mere vehicle weight, is low.

In dealing with the whole problem, the first proposition advanced by Mr. Tait was, "That the haulage capacity of engines should be based on a uniform proportion of tare weight to gross weight behind the tender."

This important consideration was aptly illustrated by the speaker when he pointed to the self-evident answer to this question, "When you say that an engine will take 900 tons over a certain grade, what kind of tons do you mean? Do you mean two-to-one tons; that is, 2 tons of contents to 1 of tare? Or do you mean three-to-one tons, or one-to-one tons? It makes a great difference which you mean. For example, let us take a train of dressed beef. We will say that the load for the engine is 900 tons. The cars will average, say, 15 tons, and the beef and ice, say, 15 tons, or one-to-one. Each car, with contents, will weigh 30 tons, and 30 cars will make up the 900 tons. Now convert the beef into grain, carried in cars of 30 tons capacity. We will have the cars weighing, say, 15 tons, and we have 30 tons of a load in each car, or two-to-one. Each car, with contents, will weigh 45 tons, and we can get our 900 tons into 20 cars, instead of having it in 30 cars. Which train will pull the easier, the beef or the grain, each weighing 900 tons? There can be no question about that. Any engineman will tell you he would prefer to pull the grain (the two-to-one train)."

Proceeding to a logical deduction from this reasoning upon observed facts, Mr. Tait continued: "What does this mean? It means that if the engine can take 900 tons in a beef train (one-to-one), it can, by reason of the smaller percentage of tare, take a greater tonnage in the grain train (two-to-one). Our method is devised to take care of this: to profit by the large capacity car fully or well loaded (small percentage of tare); and, on the other hand, in the case of a train having a high percentage of tare, to prevent the overloading of engines."

The proportion decided upon by the Canadian Pacific officials was one ton of tare to two tons of contents. Having decided upon what they thought to be the most advantageous proportion of tare to load, it becomes then a matter of important operative detail to maintain that proportion in actual practice.

The second proposition stated by Mr. Tait was "That in loading engines the resistance of every train as compared with that of a train having this uniform proportion of tare should be determined."

A dynamometer car was used with each of the different classes of engines, and the actual resistance of each train of known weight passing over existing grades and around actual curves was thus included in the results obtained.

The dynamometer car, therefore, gave readings in which mere mathematical calculations, or theoretical estimates of conditions were absent. The actual haulage capacities of the different classes of engines employed having been found, in an extended series of tests made in actual service, the work of placing these results in a convenient table was proceeded with. A number of standard simple ten-wheel freight engines were set down as the 100 per cent. class, and in this class were also included some simple consolidation, some compound ten-wheelers and some simple mogul engines, making the 100 per cent class reach a total of 122 engines in all. This "normal" class, as we may call it, contained the bulk of the freight engines used, and formed, if one may so say, the "datum line," above and below which all other classes were ranged. In a table prepared for use on the road the numbers and percentage class are given of all engines on that large subdivision of the Canadian Pacific over which Mr. Tait presides, viz., from Fort William to the Atlantic coast. A further modification of the haulage capacity is made by taking into account the class of train and the state of the weather. A very extensive and carefully worked out table had to be prepared, in which the figures in the vertical columns to the left of the various blocks of figures, forming together a pyramid, indicate the tonnage of "contents," and the horizontal base line of the whole pyramid gives the "tare" tons. If an engine rated as capable of hauling 900 tons over the ruling grade had to be supplied with a train, the tonnage of "contents" and tare being known, reference to the table determines the gross weight to be hauled. A "contents" weight of 500 tons and a "tare" weight of 400 tons would give a gross weight of 900 tons, but owing to the proponderance of "tare" in such a case an engine rated at 900 tons for the ruling grade would not be able to haul a gross weight so distributed. Such a train would be too heavy by 45 tons. If this train had to go forward an engine capable of hauling at least 945 tons would have to be supplied. In this way the mere figures of gross tonnage are not sufficient. The fact that 900 tons so hauled would be carried upon more wheels than 900 tons distributed with a less proportion of tare to contents is the important and vital consideration. To haul about 900 tons with an engine rated for 900 tons over the ruling grade the tare should be about 386 tons and the contents about 458 tons. The nearest figures to these in the table give the total load at 900 tons. These figures, when added together, however, give 844 tons gross weight. Again, it is evident that it is the proportion of tare to contents which determines what the engine is doing in the way of actual work.

It will thus be seen that the yardmaster cannot overtax an engine by giving it the theoretically correct load so badly distributed as to compel it, silently but nevertheless truly, to do work equivalent to the transportation of 945 tons over the road, with, heretofore, only credit for 900 tons, and an actual coal, oil and time expenditure equal to the larger figure. It is in this feature of the new Canadian Pacific rating, this fairness to the mechanical department, that the virtue of the system lies. It is to this skillful handling and mastering of the crux of the whole question of tonnage rating of engines which forces to the front the value of moving the greatest "paying load" in every train, and not merely in overcoming the coal-consuming journal, flange and wind resistance up to the theoretical capacity of the engine, that places this system on the high plane of commercial advantage to which it may justly lay claim.

Tonnage Rating of Locomotives

Pacific Coast Railway Club, Nov. 17, 1901.

The paper on this subject was read by Mr. B. A. Worthington, who is in change of tonnage rating on the Southern Pacific Railway. The first tonnage rating on that road had been introduced on July 1, 1897. The new tonnage rating differed from the old in the introduction into the latter of the *time* element, and has been in operation since the spring of 1900.

The tonnage rating used, is based wholly on calculations which include Wellington's values for train resistance between speeds of 10 to 30 miles per hour, traction of locomotives derived from average curve of mean effective pressure in cylinders prepared by the Motive Power Department, the relation between train speed and piston speed in terms of the length of stroke and diameter of drivers, and the equation for traction based on cylinder power. The value of momentum was made use of, and a table was prepared showing the load in M's (a unit equalling 1,000 lbs.) that could be taken at different speeds between 10 and 35 miles per hour, for each section of track on every division, and from this table was prepared the time-load diagram. This latter was based on the most economical load consistent with the time limit that could be taken per unit of engine power, showing the number of minutes net time that should be consumed and the average speed in miles per hour that should be made with the prescribed load. From this time-load diagram the mechanical engineer prepares a rating sheet.

Mr. Worthington tells us "the question of constructive weight allowance for empty and unloaded cars was fully considered, which, in making less allowance on gradient sections, is based on the fact that only the rolling and atmospheric resistance are greater per weight unit of empty cars than per weight unit of loaded cars."

This system depending upon careful calculation, and worked out to a surprising degree of correspondence with actual service, as determined by tests, has as its *motif*, the maximum load, hauled in the most economical limit of time. It was to the sharp competitive conditions to which the Southern Pacific had to submit that the introduction of the time element is due. This time limit between points has in it all the way through, an allowance for stops, it is one half-minute per mile on through freights and this has been found sufficient to cover the time actually required for station, water and meeting stops. A locomotive has not only to haul a stated load but it is expected to haul it over the road at a given speed, and thereby occupy the track between known points for a certain time. The expectations of dispatchers and others on the road have therefore some sort of official basis to rest on in laying out "the day's work."

Shop Practice, Machinery and Tools

Crushed Cast Iron for Grinding

Dixie, Feb., 1901, p. 26.

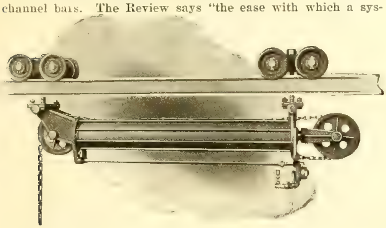
Those who have investigated the various crushed metallic products for grinding purposes, says a German contemporary, will know that nothing is superior to burnt saw steel hardened and crushed. In Germany a white cast iron is sold quite extensively, and the method of making it is given herewith. It is necessary to produce a material which upon crushing does not yield too much powder, for this is practically inert for cutting purposes. This means that the size of the pieces to be crushed should not exceed a nut or bean, be not too brittle and be white throughout. In pouring the stream of melted iron it can be divided into shot by directing against it a strong jet of water, or even compressed air. The size of the shot can be regulated tolerably by varying the direction and intensity of the jet of water or air with respect to the stream of melted iron, which may also be varied in thickness. Another method is to provide a disc of iron in which are cast radial grooves; this is placed directly over the water and rotated. The stream of iron bounds upon the plate and scatters into globules which are chilled by the water. By varying the speed of the disc the size of the shot is determined. The ordinary methods of stamping and sorting are used to make the crushed iron marketable. It may be added that only low silicon irons are available for this work.

The Baltimore & Ohio Railway has presented an eight-wheel passenger locomotive to the University of West Virginia, at Morgantown, W. Va. The engine will be erected in the mechanical engineering department, and used in the instruction of men in that course.

Shop Hoists

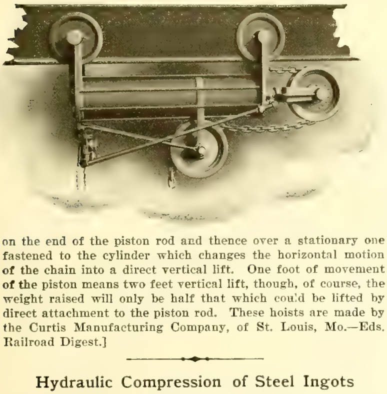
Railway and Engineering Review, Jan. 5, 1901, p. 3.

Under the head of "Shop Notes" the Review says a few words about shop hoists and has three half-tone cuts showing pneumatic hoists, stationary and with trolleys, which run on channel bars. The Review says "the ease with which a sys-



tem of channels on which to run traveling hoists can be placed in a railway machine shop makes it often seem odd that such a system is not a more usual sight."

[We reproduce two illustrations of the hoists, showing them on single and double rails; the method of supplying air is not shown. Although the matter is not referred to in the article, the illustrations show the hoists very cleverly placed so as to get the maximum lift with the minimum use of head room. The hoist is suspended horizontally and the motion of the piston is parallel to the ceiling; the hoisting chain passes over a pulley



on the end of the piston rod and thence over a stationary one fastened to the cylinder which changes the horizontal motion of the chain into a direct vertical lift. One foot of movement of the piston means two feet vertical lift, though, of course, the weight raised will only be half that which could be lifted by direct attachment to the piston rod. These hoists are made by the Curtis Manufacturing Company, of St. Louis, Mo.—Eds. Railroad Digest.]

Hydraulic Compression of Steel Ingots

Iron Trade Review, Feb. 14, 1901, p. 18.

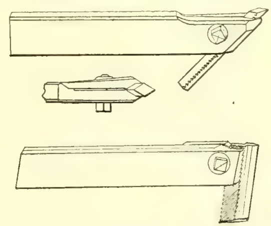
This article comes originally from a Vienna technical journal. A description of the practice at St. Etienne is given. All methods of compression used up to now are based on the Whitworth process. In them pressure is applied to the upper part of the ingot. This tends to flatten it, causing the cooler outer shell to bulge, and thus occasioning internal stresses, which beget ruptures. As the shell in cooling gradually thickens it forms a strong column, which carries the weight and prevents it acting further. The inner red hot and partly molten central mass is still able to form what is called "leakage," and porosity of the core. Leakage is the internal space formed at the top of the ingot by the contraction of the metal, the hot interior sinking down to fill the space left by contraction. In the St. Etienne process all the pressure is applied at the lower and wider part of the casting. The mold being cone shaped, the metal is forced to constantly assume a smaller cross-section. In this manner the ingot is compressed along its sides in the conical mold, the shell is compelled to contract, internal "leakage" disappears and the molten metal is forced against the upper part of the ingot. The pressure operates until contraction of the metal ceases. It is claimed that this process accomplishes these results: (1) No leakage or porosity along the core, and no pipes or cavities are formed. (2) Cracks are prevented, since internal stresses do not occur. (3) The greatest possible improvement in unworked metals is obtained. With an inclination of 1-40 in the sides of the mold and with a pressure of 10,000 tons a pressure of 40,000 tons on the sides of the ingot can be obtained, friction being allowed for; without friction allowance the pressure is 400,000 tons.

A New Lathe Tool

American Machinist, Feb. 28, 1901, p. 235.

Under the heading "Some New Things" the Machinist says:

The cut shows two forms of a new style of lathe tool with adjustable and renewable cutter, the upper tool being a "diamond-point" and the other a V-thread tool. As each cutter has oblique serrations on one side of it, with corre-



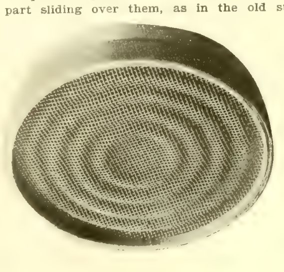
sponding teeth on the surface with which it contacts on the holder, it is held securely without overstraining the screw and by using the successive steps the hight of the cutting point is minutely adjusted as required. The V-tool is offset to the left side, so that in cutting right-hand threads it can be worked close up to a shoulder. Cutters are furnished of either self-hardening or tempered tool steel. The tool is made by the Kirkpatrick Saddle Company, Springfield, Ohio.

A New Foundry Riddle

The Foundry, Feb., 1901, p. 268.

A new riddle for the foundry has been designed by H. S. Vrooman, 220 West 20th street, Chicago. As Mr. Vrooman used to be a moulder himself, he ought to know what constitutes a good riddle.

From the illustration it will be seen that the wire bottom is corrugated in concentric circles, which increases the screening surface and adds rigidity to the bottom. The screen as thus made riddles sand faster than one made of flat cloth, from the fact that the sand strikes the corrugations and passes rapidly through the meshes instead of a large part sliding over them, as in the old style of



riddle. The corrugations also spread the sand over a greater screening surface. It has been demonstrated that the corrugations increase the working capacity of a riddle fully 50 per cent.

Solder for Cast Iron

Trade Journal's Review, Feb. 15, 1901, p. 51.

In a recent meeting of the Verein Deutscher Ingenieure, reported in the issue of Jan. 12th, of their journal, Leyde drew attention to a new method of soldering cast iron with the help of some low oxide, as a rule cuprous oxide. The parts are cleaned with acid, smeared with a mixture of this oxide which the inventor Pich styles ferrofix, pressed together, and strewn with borax and hard solder. Instead of borax the inventor further proposes to use a material which he calls borfix. The lecturer showed a toothed wheel, 40 in. in diameter, weighing 200 lbs., which had been soldered in six different places in this way. He also exhibited a bar, 2 in. square, which had been cut across the soldered seam with a chisel without splitting. Tests conducted at the Charlottenburg testing station have given very satisfactory results as to the strength of these seams. The oxide probably acts by burning the carbon in the cast iron, so that pure iron can penetrate into the pores and cake the two surfaces together. The process is only meant for rough repairs on the spot. Blacksmiths used to apply brass turnings for soldering cast iron with moderate success; the action would probably be similar.

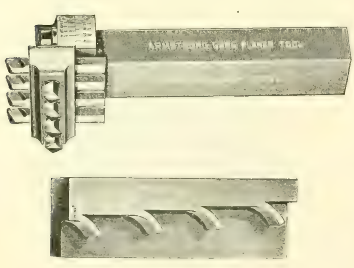
Armstrong Gang Planer Tool

Iron Trade Review, Feb. 7, 1901, p. 17.

The Armstrong Bros. Tool Company, of Chicago, has recently perfected a new device, whose construction and operation are shown in the illustration below. It is the Armstrong gang planer tool, which is made in three sizes carrying respectively four, five and six cutters. This tool is especially adapted for surfacing large castings and on this class of work it is claimed it will effect a saving of 50 to 75 per cent. in the time required to do the same job with a single point tool. As shown in Fig. 2, the head of the tool is solidly secured to the shank, on which it swivels to a limited degree, by means of a deep and closely fitting tongue and socket, and when set its position is fixed by means of two steel collar screws. The head is graduated, thus enabling the tool to be quickly and accurately set to any desired feed. Both shank and head are drop forged of steel and all parts are hardened. The set screws are tool steel tempered on the point.

Fig. 3 shows a cut taken with the No. 61 gang planer tool set to 1/4 inch feed, distributing the cut 1/16 inch on each cutter. Each chip being comparatively light, a planer with this tool will carry with ease a feed and depth of cut much greater than would be possible when using an ordinary tool and there is much less tendency to "break out" at the end of cut.

The cutters are made from stock sizes and shapes of self-



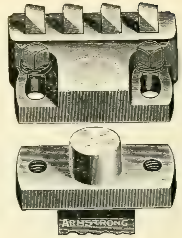


FIG. 2.

FIG. 4.

hardening steel which are readily obtainable. In grinding cutters it is of course necessary to obtain uniformity of shape and clearance. To enable this to be done easily and accurately there is furnished with each tool a gauge, shown in Fig. 4. To line up cutters to uniform depth it is only necessary to let them rest on a flat surface while tightening set screws.

Medical and Surgical Matters

Sanitary Precaution for Coaches

American Engineer and Railroad Journal, February, 1901, p. 41.

"A reform in the interest of healthful conditions of railroad travel has begun on the Chesapeake & Ohio by the removal of fret, grillwork and other dust depositories from its passenger cars. It is done without sacrifice of art in ornamentation, and the result is altogether an improvement. The good work should not stop until all plush hangings, carpets and fuzzy blankets are removed from parlor and sleeping cars. These should give place to materials which may be washed or disinfected at the end of every trip. Specialists insist that this reform is necessary. It seems reasonable, and we have no doubt that too little attention is given to these precautions. The fact that the improvements tend in the direction of economy should help the good work along."—[In this connection attention is directed to an article in the Railway Surgeon of Dec. 11, 1900, on "Sleeping Cars and Infectious Diseases," a resume of which appeared in the Digest of January, p. 28.—Eds. Railroad Digest.]

Suggestions for Railway Disinfection

Railway Surgeon, Jan. 1901, p. 61.

Dr. Earle Grady, of Tryon, N. C., read a paper at the fifth annual meeting of the Association of Surgeons of the Southern Railway. He said it would be considered almost a calamity if one had to occupy a room that had been used

by a consumptive, even if the best methods of disinfection had been resorted to. Yet people who would object under these circumstances make no objection to traveling in sleeping cars which were not disinfected at all, and which have been used for months and have often carried consumptives and others, suffering from infectious diseases. The writer believes these cars are well cleaned by the railway companies, but that does not do away with the germs harboring in the car. In his own experience he has been able to trace cases of scarlet fever, measles and diphtheria to the sleeping car. He says that a car closed up tightly can be thoroughly disinfected and all germ life destroyed by the use of formaldehyde gas. It is a powerful disinfectant and most efficatious germicide.

W. T. Simpson, who has been for thirty-one years with the Grand Trunk Railway System, has resigned the position of traveling engineer, and has been appointed a traveling representative of the Michigan Lubricator Company, of Detroit, Mich. Mr. Simpson is the inventor and patentee of the Michigan driver brake retainer.

Miscellaneous

Liquid Air as an Aid to Combustion

Trade Journals' Review, Jan. 15, 1901, p. 31.

It was noticed some time ago that if liquid air was allowed to evaporate freely, the nitrogen in it passed away more quickly than the oxygen, and that consequently the final product was a gas very rich in the latter element. A German engineer by the name of Hemple purposes to utilize this property in the combustion of low class fuels, such as lignite and peat, and has designed and constructed a furnace for the purpose. At a proper distance from the latter the liquid air is allowed to vaporize, and the first vapors, rich in nitrogen and poor in oxygen, are separated, while those coming later, containing as much as 50 per cent. of oxygen, are led under the grate bars, with the result of greatly intensifying the combustion. It is said that the enriched air can be supplied at a cost not to exceed 81 cents per 1,000 cu. ft.

Test of Fireproof Paint

Railway Age, Feb. 8, 1901, p. 1901.

The Age gives an account of a practical test of the fireproof qualities of the National Fireproof Paint Company's product. Two little wooden houses were built on a vacant lot. They were made of inch lumber and were 8 feet x 8 feet x 9 feet high. They were placed 5 feet apart, and one was painted with the best ordinary linseed oil paints and the other with this company's paint. A fire was built midway between the houses. The building painted with ordinary paint was consumed, while the fireproof building, although it caught fire and though charred stood its ground. One of the properties of this fireproof paint is that it is after the paint has been subjected to heat that its fireproof qualities are expected to become valuable in preventing the further spreading of the flames.

Mileage Tickets Offered on Trains

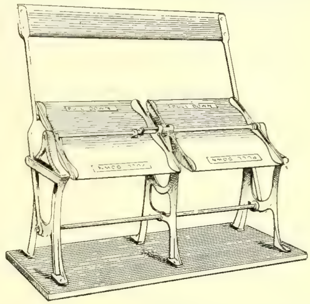
Leonard's Railway News, Feb. 23, 1901, p. 1.

A decision just rendered by the Court of Appeals of the State of Indiana may make necessary a reorganization of the Central Passenger Association's interchanageable mileage bureau, or at least the adoption of another form of interchangeable ticket. The decision in question is against the Pennsylvania, one of whose conductors refused to receive the coupons of an ordinary mileage ticket on the train for transportation. The court held that the road had no right to refuse such tickets on the train for transportation, and mulcted it in damages for the action of its conductor. This decision deprives the mileage strip ticket of most of its value as an interchangeable ticket. It throws the door wide open for manipulation of this form of transportation and renders almost impossible absolutely correct accounting between the roads engaged in this interchangeable business. The association will be asked to consider the matter at the earliest opportunity and adopt methods for securing the individual rights of all the roads members of the bureau.

The "New London" Dry Seat

Tramway and Railway World (London), Jan. 10, 1901, p. 36.

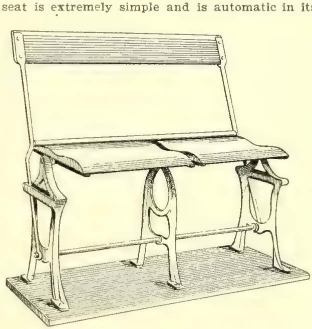
Herewith are two illustrations of the "New London Dry Seat," which was unanimously awarded the prize offered for the best invention for securing a dry seat on the tops of tramcars and omnibuses in all conditions of weather, at



the International Tramways and Light Railway Exhibition, held at the Agricultural Hall in London last year.

The competitive seats at the Exhibition numbered sixty-five, and since its success in the competition the "New London Seat" has deservedly gained in popularity with tramway committees, tramcar builders and others, and large orders have been given for the seats by corporations and car builders, and they are being largely adopted on tramcars throughout the kingdom, several very important tramway committees having recently specified the seats on their new electric cars.

The seat is extremely simple and is automatic in its ac-



tion, and can be made absolutely rigid in fine weather. It can also be made a unique and valuable source of revenue from advertisements, without in the least disfiguring the cars. It is claimed to be the best dry seat in wet weather, and the most comfortable ordinary seat in fine weather, and with all these advantages, and from the position in which it was placed at the Exposition, the "New London Dry Seat" bids fair to become a universal boon to outside travelers on tramway cars.

Redeeming Unused Tickets

Railway and Locomotive Engineering, February, 1901, p. 78.

"The ticket redemption bureau in the Grand Central Station, New York, is a branch of the New York Central's passenger department, and the business is conducted on the systematic lines that characterize all departments of this company's service. Applications for redemption of unused or partly used tickets are received in person or by mail and through ticket agents, and adjustments are made as rapidly as circumstances will allow. A ticket agent is authorized to redeem a ticket sold at his office, bearing no evidence of service of any kind, if presented by the original purchaser within thirty days from date of issue. In other cases he is authorized to receive for redemption a ticket valid for passage over the company's lines, issuing a receipt to the applicant and forwarding the ticket to the general passenger agent, who will settle direct with the claimant. Applications received by mail are acknowledged, and ordinary claims are immediately settled by cheque or postage. Claims requiring investigation are looked into without delay, and it rarely happens that they are more than one week in course of adjustment."

No More Flat Wheels?

Railway and Locomotive Engineering, February, 1901, p. 79.

A bill has been introduced into the House of Representatives prohibiting the operation of a street car having a flat wheel or broken flange. A penalty of $100 a day for each car so operated is fixed by the act.

[A street car inspector will not be able to manipulate a gauge so as to prove to his own satisfaction that the "flat spot" was less than the prescribed limits, nor will he be able to put a "slight skid" into the "open end" to avoid detection, as his steam railway confrere has once in a while been known to do.—Eds. Railroad Digest.]

Railway Reform in Great Britain

Fortnightly Review (London), Feb., 1901, p. 207.

Rudyard Kipling, under the heading given above, has written a satire on railway management in the British Isles. He has written it in the quaint style of the story-teller in the Arabian Nights, and the scene is laid in the city of Bagdad. "A certain Afrit of little sense and great power, named Beiman Be-uql, dwelling in the city of Bagdad, had devised brazen engines that ran upon iron roads." "Now the Afrit didn't make benefactions for the sake of the approbation of Allah, but for money." "The people of Bagdad who were both amorous and adventurous, disported themselves by day and by night on these engines, and gave the Afrit gold as from a catapult, and some twelve merchants of the city entered into partnership with the Afrit for the gains that accrued."

"The Afrit became slothful and ceased to concern himself at all with the comings and goings of his brazen engines. A rumor of this reaches the Kaliph, who with two friends, in the disguise of Frankish merchants, travelled over the lines and were evil entreated.

The conditions printed upon a first class railway ticket are thus humorously paraphrased by Kipling. We sometimes see something like them on the back of an American railway pass.

"By the merit of this white bond, it is permitted to such an one, son of such an one, to enter into such and such an one of my engines and to sit in the place appointed for such as hold the white bonds, and to proceed to such and such a place.

"But it is forbidden to such an one to linger more than a day after that he has purchased the bond; nor may he give the bond even to his maternal uncle, but must strictly seat himself at the hour appointed.

"Moreover, I take Allah to witness that I wash my hands, thrice of all that may befall this person, either by the sloth and negligence of my Afrits, or by the sloth and negligence of any other Afrits, or by the errors of any of the creatures of Allah!"

And it was signed with the seal of the Afrit, and the Kaliph said. "This is a notable bond."

Kipling tells us further that "Throughout the length and the breath of the Kaliph's dominions there was not one brazen engine which arrived upon the hour appointed; nor within an hour of that hour, nor was there any shame or penitence among the servants of the Afrit. There was no dependance upon their veracity and no refuge under the shadow of their assertions."

The Kaliph then returned to his palace and effected the needed reform by paying such extravagant and burdensome honors to the merchants when any of the brazen engines arrived at the hour appointed that they wearied of the applause of their fellow-citizens and applied all their energies to the movement of traffic, and though they were compelled to labor with exceeding diligence, it was preferable in their eyes to the heavy honors bestowed upon them and the mock applause of their fellow-townsmen.

[The New York *Times* literary supplement says that the railways which Kipling thus satirizes are simply suffering from over crowding—in many cases they are not equal to the passenger traffic offered to them.—Eds. Railroad Digest.]

"Supremacy" in Iron

Toronto World (Toronto), Feb. 17, 1901, p. 4.

The World gives an editorial account of the address of Mr. Maxham, Vice-Pres. and Gen'l Manager of the Dominion Iron and Steel Company, of Sydney, Cape Breton Island, delivered before the Toronto Board of Trade on Feb. 16. Mr. Moxham said Canada was probably destined to become the greatest iron and steel producing country in the world. He said that Sydney was a name now familiar to the leading steel makers of Great Britain, and before another year many of them will personally visit it. Germany is also debating as to the future of this latest iron center. The strength of Sydney's position, he said, is openly and absolutely conceded by every iron and steel expert in the United States. The cost of making iron is divided into expense for labor, and expense for material. The labor cost is a constant, and is practically the same all over. It is the assembling of the coke, ore and limestone that is the variable item of expense. Mr. Moxham figured out the cost of assembling the necessary materials for making a ton of pig metal at Pittsburg at $3.25; the cost for doing the same thing at Sydney is 79½ cents per ton. This is the lowest assemblage cost in the world, and the difference between Pittsburgh and Sydney in this item is therefore $2.45½ per ton. After the iron is produced at Pittsburgh it has to be sent to tide water, and when it reaches New York it is 1,000 miles farther from the principal consuming markets than is the product of the Sydney furnaces. After entering into a critical comparison of the advantages of Sydney over Pittsburgh in the assembly of the material for producing, and in the distribution of the pig metal and steel to the markets of the world, Mr. Moxham finds that there is a difference of $6.00 per ton of pig metal in favor of Sydney. The speaker also held that the materials for making iron are more favorably located at Sault Ste. Marie, Ont., than at Pittsburgh. He makes the difference $1.28 in favor of the "Soo." He also thinks that before long British Columbia will have an iron industry of its own.

Manufacture of Steel in Canada

Labor Gazette (Ottawa), January, 1901, p. 222.

The largest new enterprise is that of the Dominion Iron and Steel Company, of Sydney, C. B. This company commenced in the fall of 1899 the erection of four blast furnaces at Sydney. These furnaces are rapidly approaching completion, and will have an annual capacity of about 400,000 gross tons of pig iron suitable for the manufacture of open-hearth steel. Hematite iron ore will be brought from the company's mines on Bell Island, Newfoundland. The same company is also erecting at Sydney ten 50-gross-ton open-hearth furnaces; both acid and basic steel will be made. These furnaces will have an annual capacity of 350,000 gross tons.

Intensified Production and Its Influence Upon the Worker

Engineering Magazine, Jan. 1901, p. 568.

The editors append this footnote to the able and thoughtful article by Mr. Milton P. Higgins on this subject. "Intensified production—the great correlative of organization in increasing economy of manufacture—is probably regarded by more groundless dread than any other phase of the new industrial system. Broad-minded employers, as well as honest labor leaders, fear to find in it influences narrowing to the powers and to the life of the individual workman. To all these there is a revelation and strong assurance in the eloquent presentation of the truth of the case, as seen by one of America's most successful employers and foremost students of the labor problem."

The present system has in it one element not found in the older and bygone system of production. The old strove and the new strives to produce that which shall have in it the element of superiority of workmanship, but the new is able to produce so cheaply, as well as excellently that the product, unlike that of former days, is within the reach of the many and not of the few. This modern effort to improve and surpass has added speed to all our efforts, so that to-day all tools and all machines are called upon to work faster and produce from 10 to 100 times more than they did a few years ago. The dark view that this pressure for rapid as well as superior production degrades and drags down the worker is not the view adopted by the author. He believes, he says, that in any other system of production only the skilful ones, the superior ones, can have a chance. Now the great mass of unskilled workers can have that chance, and this great chance is, "First, opportunity and means for a decent existence; second, a demand on the individual for a little better thought and action; third, opportunity to do and be a little better by personal effort; fourth, a relief from excessive muscular fatigue and unhealthful conditions; fifth, better social advantages and conditions; sixth, opportunity for culture and education." A man entering a factory with no technical education may be called upon to tend an automatic machine. The machine is a storage battery of brains. The workman has before him a means of improving his knowledge by observing the machine. This storage battery of brains will not run indefinitely; it will soon need care, a drop of oil, a loose nut tightened, the wiping away of grime and smut, will be what the machine will soon ask of him. If he be inclined to think and to embrace his opportunities he will do what it asks, and, moreover, he will be able to study his machine, know its functions and its limitations, its weaknesses and its power. He will have constantly before him the creation of an abler mind than his own, and the conception of the inventor will be his, if he but observe and think. The worker in this country has one great advantage, he is under a system that is opposed to that of the British life, which was and is one of horizontal stratification. The American system is one of vertical circulation, and the force which suggests upward draft, in all its social and industrial life is the current of thought. He is invited to "begin a career that is ever open at the top." The use of automatic machines relieves the operator from excessive muscular fatigue, and gives him the chance for thought and effort, and his presence in the factory and in personal daily contact with his superiors gives him one more inestimable advantage—the chance for culture. Culture is not education, and it is not learning alone; it is that "refinement of mind" which comes largely through contact with better men, and with good men of all grades. "The intense industrial system," says our author, "brings every grade of worker into respectable contact with his superiors, and he associates with all grades of men." The benefits of the last apprenticeship system are surpassed by the advantages of present mode. The mechanic who enters the lowest and simplest stage—that of a machine tender is brought into close, intimate personal touch with a master who is selected for his ability and superiority as a workman and as a director. Contact with others and superiors is the main source of culture; "and when the American mechanic adds culture to his skill and technical training he will stand among the favored ones of earth, and his influence will be broad, good and mighty among men."

Intensified Production

Engineer (London), Feb. 8, 1901, p. 143.

The Engineer makes editorial notice of Mr. Milton P. Higgins' article in the Engineering Magazine for January on the "Influence of Production on the Worker." The Engineer thinks his paper curious, his style good, but also somewhat sentimental. It professes to have taken some pains to arrive at the purport of his argument and to have failed. Mr. Higgins will have it, as the Engineer understands him, that nothing is so likely to benefit mankind as driving every man and piece of machinery as hard as it can be driven. To British minds there is a limit beyond which intensity of production becomes a craze rather than a legitimate effort. It says: "In the United States, not contented with what has been done, we find men like Mr. Higgins advocating the running of factories night and day, three shifts of men being employed, each for eight hours." The editorial writer points out that three machines run eight hours each would be better than one machine run for twenty-four. It is a question of pounds, shillings and pence. Capital outlay would be increased with the number of machines, but wage account would be kept down unless it is possible to get men to work at the same rate "out of hours" as in the daytime. This brings up the question which has been largely kept out of sight in the United States, to wit, the action of the workers. This intensified production is new—it is only about ten years old! Express speed has only been attained in the last five. The intenseness of it is such that only young men can stand the strain, for the pace tells heavily not only on the workman but on every member of the staff. As tools wear out they are scrapped and new ones of latest design replace them, but men will grow old. It is said that a man more than 35 has little or no chance of employment in an engineering works in the United States. The workman of 25 when the rush began now finds himself 35 and out of a job. Mr. Higgins thinks that at least one man out of every ten can get to the top, it is the nine who object to being submerged that will have to be reckoned with if their working and earning life is to end at 40. The workman is beginning to find that intensified production is not all he thought it was. Labor troubles in the United States are very serious when they come. Before now they have resulted in something only differing in dimensions from civil war. After all, says the Engineer, there is such a thing as living too fast.

Insurance on the Southern Railway of France

Revue Generale des Chemins de Fer, Jan., 1901.

The Southern Railway Co. has, since its very beginning, paid especial attention to the care of its employees and their families in case of old age, sickness and death. It has also lent its encouragement to life insurance, the facilitating of the economical purchase of the necessities of life and assistance in the education of children.

The first object sought to be accomplished was the establishment of a home. This was organized in 1856 and established in 1857. A percentage of the pay of the men was deducted for the purpose and rules of admission established. These were that the applicant should be at least fifty-five years old and shall have been uninterruptedly in the service of the company for twenty-five years. There are, of course, other regulations that have been modified from time to time to meet fresh conditions. There is also a retreat for the sick, which, however, limits assistance rendered to children to the age of eighteen years.

In the second year of its existence the company established a store at Bordeaux for the sale of food to employes. This store purchases at wholesale, and, as far as possible, at the point of production, a varied assortment of the ordinary necessities of life, such as rice, dried vegetables, canned goods, salt provisions, dried fruits, oil, soap, wines, etc. These necessities are sold to employes at a price that barely covers the cost of handling and transportation and consequently without any profit. Circulars are distributed along the line, giving the kind and price of the supplies.

The employees, therefore, find it to their advantage to purchase their supplies from this source and thus effect a considerable saving over the ordinary retail prices. The sales for the year 1899 amounted to about $36,300. In 1861 a clothing department was added.

In order to equalize, as far as possible, the expense of living for the employes at Bordeaux, the company has established a refectory at that place. The kitchen has facilities for preparing the meals for 600 persons. The main dining room will seat 300 people at once. The tables are furnished with napkins, carafes, glasses, salt cellars, pepper-boxes, plates, knives, forks and spoons. The use of the napkins is optional and depends upon the price. The meals are paid for by tickets bought at the general store house. They cost 0.5, 1.0, 2.0 and 10 cents each.

At the time of the organization of the company, the Morcenx station, at the junction of the lines from Bordeaux to Bayonne and Moncenx to Tarbes, employed a number of people. It was located in a section totally devoid of facilities for education. A school was founded in 1864, and was divided into two sections, for boys and girls. There is a gymnasium in connection with the institution and the course of instruction includes moral and religious teaching, reading, writing, French grammar, arithmetic, the elements of history and geography, singing and gymnastics. For the boys there are also added the elements of the physical sciences, natural history, surveying, mechanical drawing, agriculture and hygeine. The girls, on the other hand, are taught needlework. The sessions extend from eight in the morning until five in the afternoon.

Compressed Air Transmission

Modern Machinery, Feb., 1901, p. 74.

It has been determined by practical experience that the relations of pressure to distance in the forcing of water do not apply in the case of air, especially for long distances, although for short distances they may be assumed to be similar. Therefore, if a certain head of pressure be required to maintain an air current of a given volume and force through 1,000 feet, twice the head would not be sufficient for 2,000 feet. This is because of the increase in volume due to reduction in pressure, or loss by head, by the time the end of the first 1,000 feet had been reached. Consequently a greater pressure must be used to counteract this increased volume, in addition to the extra head required to maintain the force of the current beyond. The bulk of the pressure, however, is lost by leakage and by the bends and elbows of the tube, especially when the latter have too small a radius, the resistance or retarding effect increasing in some at present unknown proportion as the radius of the curve diminishes. In one case the loss of pressure, including leakage, was only 2 pounds of the initial 60 pounds required to transmit 875 cubic feet of air per minute through an 8-inch pipe 7,150 feet long. In another case, the driving of the Jeddo tunnel, at Ebervale, Pa., the loss was only 0.002 pounds in transmitting air through a 6-inch tube a maximum distance of 10,800 feet, to drive two 3¼-inch drills. The volume of air required, however, for this purpose, 230 cubic feet per minute, was in small proportion to the size of the tube used. By careful consideration the transmission losses may be reduced to a minimum.

Train Lighting in Germany

Germany is the country where electric train lighting is in use upon the largest scale, not excepting Great Britain and the United States. A speaker at a recent meeting of the Electrotechnical Association, held in Berlin, made the statement that in that country about 8,000 railway carriages had been equipped for electric lighting. U. S. Consul-General Mason, at Berlin, in a recent report to the Bureau of Foreign Commerce of the State Department, makes the statement that electric lighting has been adopted since 1893 for the postal cars on the State Railways in Germany, and that electric lighting is all but universal for that class of equipment, for the reason that it has been found that the comfort, health and eyesight of the employees were seriously compromised by the system of gas lighting which had previously obtained.

Second Assistant Postmaster-General Shallenberger was so pleased with what he saw of the electric lighting of the German postal cars that he recommended it in his annual report for adoption in this country for the railway mail service.

As an outcome of the discussion of this question is the fact that electric lighting of railway carriages is much more general in continental countries than is generally supposed. Besides Germany, Austria has made considerable progress in electric train lighting; Switzerland is quite prominent in this respect, and on Swedish and Danish lines it is rather the rule than the exception. France has adopted a system which seems to give satisfaction, and Italy is not far behind in this respect. The two great English-speaking countries—the United States and Great Britain—are at this moment far behind in the adaptation of electricity to railway train lighting.

At the recent session of the International Railway Congress in Paris the question of train lighting was presented in very able reports, and the consensus of opinion was stated in distinct terms in favor of electric lighting for railway trains as most desirable in every respect and preferable on the grounds of efficiency, economy and safety.

C. & O. Steel Coal Cars

Among orders for cars recently filled by the Pressed Steel Car Company is noted a pressed steel car for the Chesapeake & Ohio Railroad. This car attracts particular attention on account of its being somewhat different in shape from the other large cars turned out by this firm. It is a self-clearing type of car, although the hoppers do not go down in an angle as in most hopper cars, but the load is dropped by means of drop doors operated in a manner similar to the doors on a flat-bottom gondola car. This gives the car an appearance similar to the high-side flat-bottom gondola. The car has a carrying capacity of fifty-five tons of bituminous coal, the light weight being 38,200 pounds. Capacity level full, 1900 cubic feet, with 10 inches average heap 2,122 cubic feet.

It was ascertained that the car was designed specially to meet the local conditions of the Chesapeake & Ohio Railway, especially in connection with the dumping of the load at Newport News, Va. The cars will be used exclusively for the shipments of coal between the coal mines of the Chesapeake & Ohio Railway and Newport News, from which point large shipments of coal are made by water and many of our war vessels receive their supply of coal from the C. & O. tipple at that point, the coal being discharged direct from the cars to the vessels.

The cubic capacity of these cars is greater than any similar car built, as will be noted in the statement that it has a capacity of fifty-five tons of bituminous coal. The general dimensions are as follows: Twenty-nine feet 6 inches long, 10 feet wide, and 11 feet 2 inches high.

The truck frames are of the standard pressed steel Diamond type, cast-iron chilled wheels, M. C. B. standard axles and journal bearings, pressed steel brake beams and Schoen draft rigging.

The Bettendorf Axle Company announces that it has taken from the Cloud Steel Truck Company the agency for the Bettendorf I-beam bolsters, and has opened an office at 1500 Old Colony building, Chicago, from which place its bolster business will now be conducted.

The steel cars which the Cambria Steel Company are building, experimentally, are under the patents of L. M. Slack, now with the Drexel Railway Supply Company. It is stated that they also control patents taken out by Joseph Morgan, Jr., their engineer, and that they are considering patents for a hopper bottom car taken out jointly by E. H. Wise, of their electrical department, and John W. Carter, their superintendent of supplies.

BOOK REVIEWS

STEAM TURBINES.

BY FRANCIS HODGKINSON.

With special reference to the Westinghouse-Parsons Steam Turbine.

This pamphlet, one of 42 pages, opens with a very interesting historical sketch. The earliest form of turbine was that of Hero, B. C. 120. Hero did with steam what has been done with the ordinary rotating modern lawn sprinkler driven by water-power. He made practically a steam reaction wheel. The next turbine was that invented by Bianca in 1629, and consisted of a jet of steam impinging upon the blades of a paddle wheel and blowing it round. In 1705 the reciprocating steam engine appeared and the steam turbine remained, until the last few years, practically undeveloped.

The general principles made use of in water turbines also apply to steam turbines. The buckets and guides must have as little skin friction as possible, and be so arranged that the acting fluid may strike without sudden shock and have its direction of motion changed without sharp angular deflections. The tremendous velocity of steam as compared with that of water presents a very serious difficulty in the application of these principles. The velocity of steam may be stated at about 1,476 ft. per second.

Steam turbines are divided by the author into three classes: (1) Impact, of which Bianca's is an example. (2) Reaction, like that of Hero, and (3) a combination of both, with the Parsons machine as the modern example.

The writer tells us that "the fundamental principle of the steam turbine in contradistinction to the reciprocating steam engine, lies in the fact that the latter does work by reason of the static expansive force of the steam acting behind a piston, while in the former case the work is developed by the kinetic (or active, moving) energy of particles of steam, which are given a high velocity by reason of the steam expanding from one pressure to a lower."

The discussion of the best form of nozzle opens an engrossing study by itself; this form has practically been found, like many other things, by the unromantic method of practical experiment repeated and repeated with tireless but watchful persistence. The nozzle best suited to the purpose is divergent. It is the exact opposite of the fire engine and the ordinary water hose nozzle. It is, roughly speaking, trumpet-shaped. "In it the whole expansion of the steam is carried out. The steam at the mouth of the nozzle has the same pressure as at the exhaust. In other words, the steam has its energy completely transformed into mass and velocity by the time it comes in contact with the buckets." The form of the nozzle having been determined it now remains to briefly consider the construction and operation of the Parsons-Westinghouse steam turbine. The busy railroad man can perhaps picture to himself the action of steam in a turbine by the aid of appliances with which he is familiar. If a man was to take a line of hose using compressed air, and employed for blowing the dust out of plush car seat cushions, and was to reverse the nozzle so that he would get a divergent jet of air, and if now he was to take the reflector of a locomotive headlight in which the burner and chimney holes were suitably stopped up, and was to turn this jet so that the air would run down one side, he would find that it would blow outward and upward on the other side. If now he was to place another headlight reflector so as to catch the air as it left the first reflector, he would find that it would traverse the contour of the second, and experience a second reversal of direction, similar to that which it passed through in the first. Let him now imagine a series of headlight reflectors so placed as to zig-zag the current of air from one to the other, and he would get a rough and general idea of the action of the steam upon the vanes of the turbine.

The air in the first reflector was zig-zagged without following any sharp angle, but, nevertheless, roughly in the form of the letter V. The second reflector changed the direction again without sharp angle, following generally the outline of the letter A. The stream of air is then continually V'd and A'd as it passes through the series of headlights. If now all the V headlight reflectors are regarded as movable and the A ones as stationary, the principle of the turbine is clear. If all the V headlight reflectors are placed upon a wheel, each wheel in the entire series secured to the same shaft, while all the As are on a series of stationary cricles, the action of the turbine vanes is apparent. Steam from nozzles of excellent form strikes upon the first movable series of vanes and traversing them at high speed leaps to the stationary series, so rapidly as to have imparted its motion to the movable series, without having been carried very far around, just as a highly elastic india-rubber ball might fall upon the glass roof of a greenhouse and shattering the pane leap upward for the moment and over the edge of the roof without dropping through the opening which its impact had produced.

The steam having traversed the vanes movable and stationary, changing its direction in each, imparting circular motion to those which yield to its impact, rushes on through the first series to other similar circular series of greater diameter, proportional to its ever-increasing expansive force, and at last reaches the exhaust chamber, having transformed its dynamic energy into the rapid circular motion of the spinning series of cleverly devised turbine vanes by which the speed of express trains has been transferred from terra firma to "Destroyers" which rush through the waters of the great deep, at the bidding of man.

WHY A RAILROAD WANTS A CHEMIST.

This is the title of an interesting little pamphlet of seven pages by Mr. William E. Hillyer, M. S., assistant chemist on the B. & O. R. R. It is reprinted from the "Book of the Royal Blue," issued by the B. & O. Mr. Hillyer explains very clearly the reasons why the services of a chemist are of use on a railroad. He says that the railroad must follow the common law maxim, caveat emptor, "let the purchaser beware," but in the pamphlet he shows that really the railroad by so doing becomes, if we may again drop into Latin, cavendo tutus, "safe by taking heed." The fact that an impartial searching and scientific test is made of material offered to a railroad for use has the effect of keeping up the standard of quality of the goods supplied. No manufacturer desires, when weighed in the balance, to be found waning. The author says: "Products such as steel should meet the severest physical tests that are set down in the specifications, and should contain chemically the minimum amount possible of the so-called impurities, viz., sulphur, manganese, phosphorus, etc." To ascertain the facts of the case a chemical test is the only one possible.

Not only is general high quality of material practically guaranteed by such tests, but actual dollar and cent economy may result as well. An example will make this clear. A certain firm once supplied a road with poor oil, and numerous hot boxes were the result. The operating department then charged that the oilers were neglecting their business. The oilers, to prove that they were not, used more oil per car, with little better results. Finally the quality of the oil was impugned, and eventually it was withdrawn from use. Between the arrival of the oil and the "finally" in this story the railroad had borne the extra expense due to hot boxes, viz., burned brasses, waste destroyed, oil used up and delay to trains. It had also the extra expense caused by the subsequent lavish and unavailing use of oil, and that latter source of loss to the road was a distinct item of gain to the oil people, as there did not then stand between seller and buyer the impartial investigator in the person of the analytical chemist. Mr. Hillyer shows, in the matter of water supply for the locomotives, that material advantage may be gained by knowing the chemical qualities of the water at different points on the line; which is too pure, which is charged with incrusting matter, and which gives the best all round results. It is not too much to say that the author "makes out his case" very well and establishes again the verity of the old adage that "knowledge is indeed power."

AIR COMPRESSORS.

Catalogue No. 2 of the Clayton Air Compressor Works has just come from the press.

This catalogue illustrates and describes the many types of Clayton air compressors, air receivers, vacuum pumps, carbonic acid gas and high pressure compressors and the Clayton air-lift pumping system. Among the other contents of the catalogue will be found full information relative to the trans-

mission of compressed air and capacity lost by air compressors in operation at various altitudes.

It is a very satisfactory trade publication in that it shows in nearly every instance an illustration on one page with letter press, connected therewith, on the opposite page. It has a comprehensive index and an alphabetical list of 138 uses to which compressed air can be applied. The Clayton compressor people say of this catalogue:

"The catalogue is one of the most complete works of its kind published, and we offer our product as described in this catalogue, based upon a world-wide reputation, together with an experience and knowledge gained during 30 years devoted to the construction of air-compressing machinery."

ROLLING STOCK.

We have received from Mr. F. Ringhoffer not a catalogue only, but set of catalogues, six in number, contained in neatly finished cloth-bound box, suitable for library table or office desk. These catalogues contain numerous engravings illustrating the products of his workshop. The Ringhoffer works are situated in Smichow, near Prague, in Austria, and turn out a great variety of railway cars, coaches, sleeping cars, railway wagons, electric tramway cars and, among these multitudinous products, are sugar loaf trucks and military wagons. The familiar maximum traction truck used under electric cars made in these works is shown in one of the catalogues under the name of "Boggie pour les voitures à 4 essieux." The books have elegant embossed covers, and are well printed on good paper. One cannot turn the pages of these interesting little books without seeing that Mr. Ringhoffer has built cars and coaches for many of the leading railway companies on the continent.

THE BRILL CONVERTIBLE CAR.

A very neat pamphlet of some 24 pages from the J. G. Brill Company, of Philadelphia, describes the company's convertible street car. The half tones by which the pamphlet is illustrated show the method of converting a closed street car into an open one almost as clearly as does the description set forth in the letter press. A car of this description which was sent to the Paris Exhibition gained the Grand Prix. The pamphlet gives the history of the design and explains how on its merits alone this car gained this prize. It gives under the head of the uses of the convertible car, their advantages and disadvantages, and some failures. The company modestly disclaims the possession of a new idea, in the convertible car. It is in the method and form of construction which is adopted that the officers think their claim to superiority lies. Without going into the details of construction, which are elucidated in the pamphlet, we may be allowed to say in the words of the proverbial preface writer, that this convertible winter and summer car appears to us to "fill a long-felt want." A car which can be turned into a summer car on short notice, and as quickly turned into a winter one during the uncertain days of spring and fall is a car which is sure to find favor with the public and with the officials of the company owning it. An outfit of convertible cars would require only half the storage or shed room now required by companies which have to keep car bodies suitable for both the warm and the cold seasons, and who have to use up time and money in transferring them to and from the motor trucks, with the knowledge that the tardy process is not meeting with the approval of their patrons. The use of one outfit of these cars would mean with a new company the saving of the purchase of one set of car bodies, which is a large item itself.

NARROW GAUGE EQUIPMENT.

We have received from Mr. Arthur Koppel his catalogue for 1900. It is a very beautifully illustrated publication, with a striking cover upon which is depicted a typical scene, the interior of a blacksmith's shop. Mr. Koppel writes his introduction in English, German, Austrian, Italian, Russian and French, and gives illustrations showing his products in use in the four continents of Europe, Asia, Africa and America. The firm, whose New York office is at 66-68 Broadway, is prepared to supply narrow gauge and industrial railway materials.

MOTOR-DRIVEN AIR COMPRESSORS.

A neat little pamphlet on Motor-Driven Duplex Air Compressors comes from the Westinghouse Air Brake Company. The compressor consists of a pair of parallel cast-iron cylinders in which are trunk pistons connected to a crank shaft. The cranks are spaced at 180 degs. apart, so that as one piston commences its forward stroke the other begins its return, thus the pistons constantly move in opposite directions and produce a continuous and uniform thrust on the shaft. The pistons are single acting—that is, the air is compressed only on the forward stroke The axis of the crank shaft is located below a plane through the axis of the two cylinders in such a way as to minimize the angularity of the connecting rod during the forward or working stroke, and by this arrangement the wear of cylinder and piston is largely decreased. The crank shaft is of cast-steel, connected to the motor directly by gear and pinion.

The motor which drives the compressor is of the well-known Westinghouse design and is of the bipolar type. Simplicity of construction, adaptability to the work for which they are designed, render it necessary to use a field rheostat, or starting box in connection with these motors. Like the compressor, the motor is entirely dust and waterproof, and is furnished with self-oiling bearings.

The pamphlet deals also with the electric pump governor, the wiring and gives some general directions, together with some very fine half-tone illustrations, and a table of the sizes and capacity of the motor-driven reciprocating air pumps made by the Westinghouse company.

GRAPHITE AS A LUBRICANT.

In a neat little pamphlet, entitled "Graphite as a Lubricant," the Joseph Dixon Crucible Company give some very interesting and instructive facts in the rationale of lubrication by oils. On page 11 some experiments made by Prof. R. H. Thurston at the Stephens Institute are detailed: 335 miligrams of the best winter sperm oil under a pressure of 48 lbs. to the square inch ran 11 minutes, having traveled by rubbing surface 7,198 ft., the elevation of temperature was 175 degs. F. A mixture of 120 miligrams of fine perfectly pure flake graphite with sufficient distilled water to make it adhere to the bearing under the same pressure per square inch ran for 30 minutes, traveling by rubbing surfaces 19,635 ft., with total increase of temperature of 185 degs. F.

Another pair of experiments are given: 335 miligrams of best winter sperm under a total pressure of 60 lbs. ran at 2,000 revolutions per minute for 51 minutes, having traveled by rubbing surfaces 33,360 ft., with increase of temperature 185 degs. F. The same quantity of graphite grease which contained but 15 per cent. of fine flake graphite at same speed and under same pressure ran 293 minutes, having traveled by rubbing surfaces 194,941 ft., with total increase of 310 degs. F.

"The master key to the hard problems of modern lubrication is Graphite."

Another Safety Appliance Law

On March 3 the United States Senate passed the bill relating to safety appliances on railroad trains, and requiring railway managers under oath to make monthly reports to the Interstate Commerce Commission of all accidents that may occur to passengers and employes, and the attending circumstances.

"Put Me Off at Buffalo"

This refrain of a once popular song is destined to possess a greater familiarity as a by-word than ever the song earned for it, when the multitudes of people, this summer, begin the national pilgrimage to our new Mecca—the Pan-American Exposition; and, incidentally, to resound throughout the world as a means of advertising the merits of the great American railroad system—the New York Central lines. Practically all the visitors to this grand show must travel thither, either wholly or in part, over that extensive system of transportation lines, which, centering at Buffalo, includes the New York Central, Boston & Albany, Michigan Central, Lake Shore, Big Four, Pittsburg & Lake Erie and Lake Erie & Western Railways.

As George Daniels epigrammatically says, "All you need to do is to get a ticket by the New York Central Lines—all you need to say is 'Put me off at Buffalo.'"

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

M. C. & L. P. Ass'n Portrait Gallery

HENRY BLOCK.

Probably there is no better natured man or more well known member who attends our annual conventions than that more-than-six-footer, broad-shouldered, big-hearted Henry Block, foreman painter at the Brightwood shop, on the staff of Mr. J. A. Gohen, of the "Big Four." As will be seen by the short story of his life, which is here subjoined, he is one of the veteran railroad painters, and has been for more than a score of years connected with our association. To shake hands with him when he feels well is to put your hand in a railroad vise. Long ago we tried to get his photo to go among the veterans in these columns, but, like most big fellows, he is bashful. Now, through Mr. Gohen's courtesy and persuasion, we have obtained it.

He was born in the city of Greifswald, in Prussia, on August 7th, 1846, and emigrated to America with his parents in the year 1852. The family settled in the State of Texas and lived there for some years, where Block attended the public school for several years. At the age of 14 he went to work for the old Bellefontaine R. R. Line, under Mr. Keiser, foreman painter. This was in the fall of 1860. Mr. Keiser was succeeded by E. A. Snider, and he by Geo. Widner. He worked at Galion until August, 1867, when he was sent to Indianapolis to take charge of the west end paint shop of the Big Four R. R., where he has been ever since. He joined the M. C. & L. Painters' Association at Cleveland, O., in 1878, when D. D. Robbertson was president.

Death of C. A. Bruyere.

Editor Railroad Paint Shop:

By Mrs. Bruyere's request, I beg to inform you of the death of Mr. C. A. Bruyere, late foreman painter of the Canada Atlantic Ry., on February 20th, at 4:30 P. M., at his late residence, No. 17 Osgood street, Ottawa. Mr. Bruyere had been ill for several months, but his death was entirely unexpected. He leaves a mother, wife and three children to mourn his loss, the eldest child being but 5 years old. Will you kindly have an announcement of his death published in the Railroad Paint Shop. Your truly,

H. CRABB.

HENRY BLOCK.

Meeting of Advisory Board at Cincinnati

A meeting of the Advisory Committee of the Master Car and Locomotive Painters' Association was held in the Grand Hotel, at Cincinnati, Ohio, February 22d, for the purpose of preparing a programme of subjects for the Thirty-second Annual Convention, as well as to discuss other matters of interest which came up during the session.

All members of the committee were in attendance, namely:

John F. Lanfersiek, P., C., C. & St. L. Ry., Columbus, Ohio.

T. J. Rodabaugh, P., Ft. W. & C. Ry., Fort Wayne, Ind.

H. Frank Taylor, Barney & Smith Mfg. Co., Dayton, Ohio.

B. E. Miller, D., L. & W. R. R., Scranton, Pa.

J. G. Keil, L., S. & M. S. Ry., Buffalo, N. Y.

Robert McKeon, Erie R. R., Kent, Ohio.

Visiting members in attendance were: President A. J. Bruning, Chas. Becker, Wm. O. Quest, J. A. Gohen, C. B. Harwood, J. M. Kahler, Geo. Schumpp, Fred Kautter, L. Poliquin, C. I. Eagle, Geo. Paulis, S. H. McCracken, Fred. Heisel.

The subjects presented for consideration were carefully discussed by the committee, and only those of a practical nature were adopted.

The following programme, with the committees appointed on the several questions, were fully indorsed by a unanimous vote of the meeting:

SUBJECT NO. 1—Is there a method of successfully treating passenger cars (going through shops for revarnishing) to prevent the cracking of varnish on cars which are more or less cracked and which have recently been cleaned at terminals with emulsion or other cleaners containing mineral or non-drying oils? Committee: W. J. Russell, G. R. & I. Ry., Grand Rapids, Mich.; J. C. Martin, I. C. R. R., Paducah, Ky.; C. B. Harwood, C. & O. R. R., Huntington, W Va.

SUBJECT NO. 2—In a material sense, what progress has been made in terminal car cleaning? Committee: Wm. Vogel, Mo. Pacific Ry., St. Louis, Mo.; Geo. Paulis, L. E. & W. R. R., Lima, Ohio; S. H. McCracken, L. H. & St. L. R. R., Cloverport, Ky.

SUBJECT NO. 3—Practical suggestions regarding interior decoration of passenger cars. Committee: Geo. Schumpp, L. & N. R. R., Louisville, Ky.; H. Frank Taylor, Barney & Smith Mfg. Co., Dayton, Ohio; A. T. Winchell, Am. Car & Foundry Co., St. Charles, Mo.

SUBJECT NO. 4—Is it practical and to the interest of the railroad companies to adopt a piece price for all classes of painting repairs in the car paint shops without employing a certain percentage of day men? Committee: J. D. Wright, B. & O. R. R., Baltimore, Md.; A. J. Miller, L. & N. R. R., New Decatur, Ala.; W. H. Truman, Southern Ry., Columbia, S. C.

SUBJECT NO. 5—The relations which should exist between the railway company's purchasing powers and the master painter, the responsible consumer. Essay by J. A. Gohen.

SUBJECT NO. 6—What is the best paint material to use for the protection of iron and steel tanks on locomotives after the same have been prepared to receive it? Committee: C. I. Eagle, L. S. & M. S. Ry., Cleveland, Ohio; Eugene Daly, C., C., C. & St. L. Ry., Bellefontaine, Ohio; R. B. Pebbles, L. S. & M. S. Ry., Elkhart, Ind.

SUBJECT NO. 7—Has the painting of freight cars with the paint-spraying machine shown that there is any economy in its use? Is it not rather an additional cost over brush painting? And does it not produce work of an inferior quality? Committee: T. J. Mullally, The Armour Car Lines, Chicago, Ill.; M. W. Stevens, D. S. & S. R. R., Drifton, Pa.; J. G. Ginther, Wabash R. R., Moberly, Mo.

SUBJECT NO. 8—What is the best method of preparing steel freight cars for paint, and what is the best mate-

rial to use? Committee: B. F. Seisler, P. & W. R. R., Allegheny, Pa.; B. F. Wynn, Penna. R. R., Pitcairn, Pa.; Eugene Laing, Northern Central R. R., Elmira, N. Y.

Queries

1st. Can a paint be made that will dry from the bottom up?

2d. What is the best method of making illuminated numbers for locomotive headlights?

3d. What is the best method of treating front ends of locomotives with a view of keeping them in good condition?

4th. Is it advisable to add wax to varnish in order to deaden the lustre in imitation of a rubbed surface?

5th. Can a sand-blast be operated successfully in a railway car and locomotive paint shop?

6th. What is the best oil for rubbing the varnish inside of passenger cars to reduce the surface to a dead finish?

7th. What is the cause of varnish turning white on locomotive tanks, and how to prevent it?

A committee was appointed to attend the next convention of the Master Car Builders' Association, at Saratoga, to confer with them in regard to a uniform system of lettering freight cars. The committee consists of B. E. Miller, H. M. Butts and J. A. Gohen.

It was ordered by the Advisory Board that the president of the association appoint committees in different sections of the country to institute a series of car-cleaning tests, and that said committees should report results on the same at the next convention.

The committee (with visiting members in attendance) took up the matter as to place of holding the convention in September next, as numerous objections had been raised by members against Buffalo. The subject was considered at length, and it was deemed advisable to change the place for holding the next convention, owing to the accommodations in view at Buffalo and the rates members would be compelled to pay for rooms. It was then decided by a unanimous vote of the members (nineteen of whom were present) that New York be chosen as the place of holding the convention in September, 1901.

The president appointed as additional members on the Committee of Arrangements J. Hoesly and Alex. Campbell.

There being no further business, the meeting adjourned.

ROBERT M'KEON,
Kent, O., Feb. 25, 1901. Secretary.

Suggestions by Mr. Brazier

Editor Railroad Paint Shop:

I take great interest in the "Railroad Paint Shop" department of the "Railroad Digest" and have read with great interest the article by C. A. Hubbs, foreman painter of the Southern Pacific, entitled "Flatting of Varnish on Car Exteriors; Its Causes and Prevention;" also the article on "Terminal Cleaning," by our friend, J. A. Gohen, and I trust that other painters will feel like giving their experience on such conditions as are outlined in those two papers.

There are a number of things connected with painting and the care of passenger equipment which foreman painters can experiment on and give to others the benefit of their experience.

At the convention held at St. Paul I had the pleasure of addressing the painters' convention, and I impressed upon the minds of all present the importance of taking up terminal cleaning, which I am glad to note has since been prominently before you in your subsequent conventions.

Your annual conventions are held for the purpose of exchanging views and are a sort of college of education to every one that attends. Among a number of other things which an up-to-date foreman could investigate and give others, through your proceedings, the benefit of, is this question: "What is the best method of painting galvanized iron?" All railroads use more or less galvanized iron and all have trouble with the paint peeling off. The same remark relates to tin roofs. The flatting of varnish, terminal cleaning and a number of other things are subjects on which the painters, with their practical experience, can give and get valuable information.

I honor a man that has an opinion and is able to put it in shape, so that others can see the practical side of it. I think if more foremen would follow the footsteps of Mr. Hubbs and Mr. Gohen, and give an honest expression of their views and practices, it would be beneficial to all concerned, particularly to those who are in charge of car departments. F. W. BRAZIER.

Terminal Cleaning

MR. GOHEN REVIEWED.

Editor Railroad Paint Shop:

In your February issue, our mutual friend and colleague, Gohen, takes occasion to relieve his burdened (?) mind and incidentally to give me a "roasting;" the burden he wishes to unload being, "It costs more to clean cars than to paint them, and Brothers Copp and Ball question my statement." Our esteemed friend then recapitulates, or intended to, what he asserted at the meeting at Detroit, but some one got it most frightfully mixed as it appeared in cold type, giving the cost of painting and cleaning his passenger equipment for the year 1899. As I do not wish to take any advantage of the errors referred to, whoever is chargeable with them, I will simply take his figures as I find them in the report of the thirty-first annual convention, namely, for painting, $37,005.09, and for cleaning (supervision not included), $51,721.41; but $45,556.34 must be deducted from that amount as chargeable to ordinary cleaning; that is, the daily wiping, dusting and brushing of cushions, glass, closets, lamps, etc. The remainder, $6,165.07, is for what he designates as "Modocing," which, I take it, is a coined word for cleaning with "Modoc" liquid, in contradistinction to scrubbing or cleaning with any other compound. Now, according to his own admission, $45,556.34 of the amount has nothing whatever to do with the cleaning or protection of the paint or varnish, but is expended on cushions, lamps, glass, urinals, closets, etc., etc. Whew! but that does seem an awful lot to expend on cleaning the furnishings of a passenger coach; but I am not prepared to question it, as I presume he knows, and I acknowledge that I don't, never having had the terminal cleaning under my supervision.

A reference to the report of the proceedings will show that Mr. Gohen's paper contained two distinct subjects, namely, "Is terminal cleaning a factor in railway paint shop economy?" and, "What is the best and most economical material to use at terminals?" After the paper had been read and the subject matter came up for discussion, the first-named subject was entirely ignored, while the last was pretty thoroughly discussed. Those members who took exceptions to Mr. Gohen's statement were discussing the best and most economical method, combining materials, for use at terminal points for cleaning the exterior of passenger coaches with the greatest expedition and least injury to the painted surface; and when reference was made by a speaker at any time to a method or the cost of such method of car-cleaning, it was generally understood that the cleaning of the outside and that only was being referred to. It now appears from Mr. G.'s unburdening that lamps, glass, closets and everything cleanable and dustable, inside and outside, entered into the question at issue; and while part of the members were presenting their views and giving data as to the relative merits of oil cleaners versus soap and water, or weak lye, for the cleaning of the outside of coaches, Mr. Gohen and his followers were arguing from the standpoint of general terminal cleaning, inside and outside, a subject with which a large number, if not the majority of those present, were entirely unfamiliar, except so far as shop practice is concerned. The cost of this cleaning is given as 52.8 cents per car and the total number of cars cleaned is given in the article referred to as 2,494, all of which are cleaned three hundred times each year, and make daily runs. Whether the cleaners run with them he does not say, but I presume they must do so in order to clean them whenever the trains make a stop. And while admitting the necessity of this daily cleaning on the interior of passenger coaches, I do question the necessity or utility of daily cleaning on the outside, unless with a view to advance the interests of the varnish manufacturers.

In summing up he says the average cost for cleaning to maintain the paint

is $158.40 per car, and adds that "if the cost of either soap and water or emulsion cleaning be added, the cost would be increased." I have thought all this time that friend Gohen was comparing the cost of cleaning as between soap and water and an emulsion cleaner. I am evidently mistaken, and have failed to grasp the problem he has set for me; and his assertion becomes more startling, if true, when he leaves us to infer that he uses neither soap and water, nor an emulsion cleaner, but that he cleans his equipment solely by wiping and dusting, and yet it costs more to clean than to paint.

Now, accepting Mr. Gohen's figures and statements as true, we may claim the privilege of deducting from his given total, said to be the average standard on his system, 88 per cent., as properly chargeable to what he denominates ordinary cleaning, and which is entirely foreign to the question originally at issue, as I have shown, leaving 12 per cent. as chargeable to terminal cleaning as understood and debated by the members in convention at Detroit. The figures will then be to "Modocing," or cleaning with emulsion cleaners, $19 per car; ordinary cleaning, not chargeable to maintenance or destruction of paint and varnish, $139.40, making the total $158.40.

As will be readily seen, our worthy friend has signally failed to make good his contention that it costs his road $158.40 per car for maintaining the paint, because of the cleaning, or that it costs more for cleaning than painting.

But, great Scott! I had no intention, when I began, to reply to Brother Gohen, nor of furnishing copy for the whole of your next issue of The Digest, so will end at once.

F. S. BALL,
Foreman Painter,
P. R. R., Altoona, Pa.

Protective Coatings for Iron Parts of Refrigerator Cars

At a recent meeting of the St. Louis Railway Club the following paper was read on the above subject by J. A. Gohen, master painter of the C., C., C. & St. L. Ry.:

The paper herewith submitted for your consideration is a reply to Question No. 17, "The best coating to prevent effect of salt water on iron of refrigerator cars." This is one of the recurrent and intermittent questions of railway economics that are constantly presenting themselves in the construction and maintenance of railway equipment, and I opine the ever-changing conditions in construction and maintenance is a prime factor in the upbuilding and upholding of our various railway clubs to-day. They are the channels through which flow the ideas, the experiences and practices of what were once divergent and disconnected fountains of knowledge, but now consistently and directly concentrated in one vast and central basin to be fished out and digested as occasion, opportunity or necessity suggests or demands.

The question itself as relating to iron on refrigerator cars is seemingly of minor import, but it will apply just as readily to one of greater import and the solution will be the same. I refer to the protection from rust of all iron cars, a somewhat recent innovation in railway transportation.

It is a question of to-day whether the wooden car will not soon be a thing of the past in the transportation of merchandise, and the iron car displace it, as it is now doing in the transportation of coal. There certainly must be some assurance in the minds of some of our eminent practical mechanical men that the iron car is the best adapted for the present requirements. This conclusion is arrived at, perhaps, from the fact that wood will soon become scarce and too valuable as compared with iron, or because it is more durable and is capable of carrying a greater load in proportion to light weight of car. It is also capable of resisting greater shocks, so it would seem logical that the iron car has come to stay.

This being so, we must find the best means of protecting the iron from rust and its consequent deterioration, so you can plainly see that the ulterior question is the best coating for preservation of all iron cars. However, the query being presented, I began a series of tests immediately after the December meeting of the St. Louis Club to determine, if possible, the superiority of any given paint in preventing effect of salt water on iron, such as might ensue from the drippings of refrigerator cars. In these tests I have been aided by a number of paint manufacturers in different sections of the country, notably so in St. Louis.

As none of the materials furnished has shown any superiority, the time being too limited for demonstration, I deem it just to all parties that no names be mentioned in this article. It is my intention to continue the tests until such time as one or more of them evidence some such superiority, and in that event I feel it would be proper and just to give "honor to whom honor is due."

I cannot refrain from thanking Mr. Christopher Murphy, of Chicago (Iron & Steel), for the personal interest he took in procuring for me the formula and process of coating iron pipes in the far West. The limited time precluded the preparation of the necessary appliances, as well as procuring the material, which is a California product, but I hope to make a test of it in the near future. I received a number of letters from parties too late to make a test for this meeting; one from St. Louis, dated February 4th. I intend to try these later on.

In making the test I secured suitable pieces of sheet steel 6x16 inches, preferring steel to iron, as it is more susceptible to rust. They were cleaned well and painted as follows:

No. 1. Red lead.
No. 2. Red lead and Prince's metallic.
No. 3. Red lead and graphite.
No. 4. Metallic and graphite.
No. 5. Metallic.
No. 6. Graphite.
No. 7. Coal tar.
No. 8. Coal tar and melted rosin.
No. 9. Lampblack.
No. 10. Carbon.
No. 11. St. Louis product.
No. 12. St. Louis product.
No. 13. Indianapolis product.
No. 14. Chicago product.

Nos. 1 to 9 inclusive were dry pigments mixed with linseed oil; No. 10 was a Cincinnati product prepared by the manufacturer, as were Nos. 11, 12, 13 and 14.

All these were given two coats of paint except No. 14, where only one was specified. After drying, all these plates were placed in a box containing strong brine and immersed to one-half their length and placed outside, so as to be exposed to the weather. For about five weeks the brine was dashed on the upper half not immersed two or three times daily so as to allow for the action of the air.

On February 3d I removed the plates from the brine and was surprised to find that the salt water had no perceptible effect upon any or either of these paints, nor were those parts exposed to the air affected in any degree, except in the case of No. 8, coal tar and melted rosin. On the exposed part of this one the coating had cracked or seamed, but was tenacious, with no disposition to flake. The salt water evidently did not crack it, as it was perfect where immersed.

I said I was surprised to find no evil results from the immersion of these plates in brine; my reason for being surprised was that several years ago I had made similar tests with these paints, except the manufactured ones, and immersed them in fresh water. Within a week all of them were full of water blisters and in many places the paint sloughed off.

Living on the banks of "not the Wabash," but White River, and having had little, if any, experience with the briny deep, I was nonplussed, and in this dire extremity I consulted our company's chemist, Dr. J. N. Hurty, to ascertain if he could explain the matter. He readily did so, saying that salt water naturally hardened the oil paint, while fresh water had the opposite effect. This, he claimed, was due to the comparative absence of air in salt water, while it was prevalent in fresh. He said that vessels on the lakes, either iron or wood, deteriorated more rapidly than on the ocean from this same cause. He was told at the Norfolk navy yards that the painting of vessels below the water line was not so much an object of preservation as it was the prevention of barnacles adhering to same. So it would seem that query No. 17, so far as salt water is

concerned, is extraneous. Fresh water is far more injurious, Dr. Hurty says.

Rusting of steel or iron is due to the oxygen of the air; water does not and cannot cause rust, but it can and does carry oxygen to steel. Indeed, oxygen cannot cause rust except water carries it, for dry air does not cause rust, although it contains oxygen. I asked him if salt water would cause rust. He said undoubtedly it would if it were allowed to drip on iron as it does on refrigerator cars, for it carries air with it in the dripping.

It is manifestly plain, therefore, that there are two ways to prevent the effects of salt water on iron of refrigerator cars. First and possibly the only logical way would be to apply suitable drip pipes to deflect the water from the iron direct to the ground. This would end the trouble immediately and effectually. The other way would be to paint all the irons in a rational way instead of the absurd manner in which it is done, and then keep them so painted at all times, for neither salt nor fresh water will rust iron if well painted. This would be impracticable as well as extravagant, and if ever indulged in would readily cause our freight agents to revise their rate sheets or bankrupt the railroads.

There is an idea, unfortunately, too prevalent on all railroads, that one coat of any old paint is good enough for the iron of car trucks, and the cheaper the better. The sooner we get rid of this idea the better, especially as the trend is toward iron trucks exclusively, especially pressed steel. What should prevail would be the practice of painting the trucks as carefully and consistently, and with as good paint as we use on the bodies. The rust should be removed as well as the dirt and grease, and this should be done every time the body is repainted. If so, the deterioration of car trucks would be greatly lessened, with a corresponding reduction in maintenance. The old maxim that "What is worth doing should be well done" is applicable to painting car trucks.

In conclusion, I will say that it will be a duty as well as a pleasure for me to pursue the tests I have instituted, and hope to be able some time in the future to tell you definitely which is the best coating for the purpose mentioned. As it now appears, any one or all of them will meet the requirements if properly applied.

Change of Convention Place

Apropos of the change of convention place, made at the late Advisory Committee meeting (see report in another column) of the M. C. & L. P. A., we clip the following from the Boston Globe relative to the action of the telegraph superintendents. It appears that they want to go to Buffalo instead of Boston and are balloting on it by mail, which, by the way, is the only legal and satisfactory way for our association to do regarding the change from Buffalo to New York, as our Constitution does not delegate this power.

The President may, for important reasons, name a new place of meeting, but it must be submited to members for ballot by mail or a meeting of the association called for that purpose. The late Advisory Committee meeting, at which visiting members were present and voting, was not competent to make this change:—

"CONVENTION OF RAILWAY TELEGRAPH SUPERINTENDENTS LIKELY TO BE HELD IN BUFFALO, IN PREFERENCE TO BOSTON.

"NORFOLK, Va., Feb. 28.—The next annual convention of the American association of telegraph superintendents may be held at Buffalo instead of at Boston. The Hub was selected as the place of the next convention, but strong pressure is being brought to bear upon the president of the association to induce him to change the place of the meeting.

"The President is W. F. Williams, Superintendent of Telegraph of the Seaboard Air Line railway, with headquarters in Portsmouth. He has taken the matter up through the Secretary with the members of the association, and they are now voting by mail on the proposed change. The answers are coming in by every mail, and it is quite apparent that the attractions of the Pan-American Exposition are going to prove too much for the claims of the adherents of the Boston convention."

Manufacture and Maintenance

Making cars and maintaining them are two vastly different matters. A fellow may be a signal success at his part in a shoe factory and prove a dismal failure as a cobbler. What to do to a locomotive to make it run while on the rails is tolerably clear to a fairly experienced person; but what to do with it when it is in the ditch is quite another problem. Making things according to the flight of fancy is interesting and perhaps not extravagant at first cost, but the matter of their maintenance after years of wear is often perplexing, annoying and expensive. Sometimes those who make things know little and care less about their maintenance, so long as they are acceptable when new and they are off their hands and they have got their money for them. Some other fellow must wrestle with this expense and perplexity.

If those who know the ins and outs of car maintenance from the painter's standpoint had the designing of the wood work, both on the exterior and interior, but particularly the latter, things would assume a different shape from what they are in many instances. For this reason it might be advantageous to railroad companies to have the draftsman and painter get their heads together along these lines.

But we are drifting from the course we set out to pursue with this article. We meant to say that it is straight goods to make and paint cars when new, and easy enough to burn off and repaint their exteriors occasionally, if we will do it, but to maintain their interiors after years of wear requires something more than "a lick and a promise," which they too often get in the ambition and rush to make a big showing in the number of cars turned out of a shop per month. In other words, it is easy enough to get an equipment into a hole by neglecting its constant care, but not so easy to get it out. Here is where heroic treatment will have to come in, later on, that will cost such time and money that the regular quota of cars expected from a shop do not seem to materialize and the wonder why is expressed. A car seems simply to be a car in the minds of many; and so it is, to be sure, in a sense. A picture is a picture, but it may be so obscured in the beauty of its colors by accumulated grime and dirt, and oil and varnish, that the first thing a connoisseur at restoration would say as he beheld its once primitive beauty, "If I only had that long enough to get down where those colors are with solvents and restoratives what a work of art that would be! Why, that is one of the works of the old masters." This is often done with valuable pictures, and consequently a business in their restoration is established in large cities.

It ought to be the business of every car paint shop to restore valuable cars that are apt to get seedy under accumulated varnish and grime and the neglect that the very bad practice of sending a car this year to one shop and next to another on the system engenders. But it is not done. The Master Painter cannot see half the cars on a big system to prescribe their remedy. Hence, the responsibility of doing them justice is often shifted to other and imaginary shoulders that the car may arrive at "next time." "I'm not going to father and remedy all the neglect of other shops," is the cry, and so it goes. A car sometimes turns up at a shop ten years old where it was built and in a sorry plight, and away it goes again with "a lick and a promise," perhaps the lick and no promise, so long as possible by the public—"nobody's dog, nobody's child." If cars on a division could only be maintained at the shop on that division—and we cannot see why this may not be done —what a wholesale rivalry would result in seeing who could maintain the best looking equipment. Carelessness and negligence would then have to be fathered and remedied. But when a car becomes a town pump with everybody at its handle, it need not appear strange if it gets woefully out of order.

A cord of pitch pine under distillation gives the following substances: Charcoal 50 bushels, illuminating gas about 1,000 cubic feet, illuminating oil and tar 50 gallons, pitch or rosin 1½ barrels, pyroligneous acid 100 gallons, spirits of turpentine 20 gallons, tar 1 barrel, wood spirits 5 gallons.

Transparent Primers

We are of the opinion that manufacturers of surfacers for passenger equipment make a great mistake in putting transparent primers on the market, for the reason that they are not so practicable and durable as an article containing sufficient pigment to make it opaque. Most ready-prepared primers that have come under the writer's experience and observation would be improved by addition of five pounds of keg lead to each gallon of primer, together with sufficient lampblack to tint it to the required shade, and one-half to three-fourths of a pint of raw linseed oil, more or less, thinned to a working consistency with spirits of turpentine.

Workmen can see what they are doing in the application of such a primer, and the addition of the lead and oil makes it more adhesive to the wood or iron and renders it a better foundation upon which to build a lasting structure of paint and varnish. If a car is so long in service that the varnish perishes, the foundation made by such a primer is more likely to remain intact than it otherwise would, and can be readily put in shape again, not having chipped and peeled.

Transparent primers with a stain added are little, if any, better than the colorless variety. It is beginning a job of painting backward by varnishing the car first and painting it afterward, and it is all wrong. The pigment in the primer, particularly lead, makes a proper tooth for the following coat to bite on. Moreover, like the plasterer's mortar, properly tempered with hair in it, to protrude through the laths and clinch, this primer has the proper toughness of tooth to hold on after it has penetrated the pores of the wood and clinched. Not so the brittle, resinous, transparent variety. They may penetrate all right; but that which penetrates does not contain the requisite toughness for permanent adhesion. In other words, the clinch of the mortar lets go, not having the hair to hold it together—to follow the illustration. This is a vital point in permanent car and engine painting. We do not absolutely stick for lead as the only all-sufficient primary pigment. There are earthen substances, no doubt, that, when properly prepared, make excellent material for this purpose, such as minerals, silicates, etc.; but, by all means, put on a properly compounded paint of suitable pigment with the requisite vehicles. To this puttying may be done at once, when dry, making a sure foundation for it, from which it will not protrude and crumble, not having to wait for the second coating.

U. S. Grant wields the brush at Lyndonville, Vt., and is bound to "fight it out on that line," we suppose, "if it takes all summer." "Let us have peace."

NOTES AND COMMENT.

Mr. F. W. Brazier, assistant superintendent rolling stock N. Y. C. & H. R. R. R., writes the editor of these columns a very interesting letter which I take the liberty and pleasure of inserting in another column. I trust "our boys" will take the valuable hints he gives and let us hear from them. Mr. Brazier has been and is a good friend of our association. He has attended several of our conventions in the past and has always been a welcomed and honored guest. As, by the new deal, our next convention is to be in New York, we trust he and his esteemed superior, Mr. Waitt, will be much with us to enjoy the convention's hospitality and render valuable counsel.

There are a good many bright things in paint literature issued from time to time as advertising matter, and the veteran car and locomotive painter will do well to keep an eye open to it and not consider himself so wise in his own conceit as to feel above reading it. Mr. Houston Lowe, Vice-President of the Lowe Bros. Company, of Dayton, Ohio, brought out a pamphlet last summer entitled "Hints on Painting Structural Steel," which was a real help to the writer in the preparation of his paper, read at the late Detroit Convention. Mr. Lowe has now issued a revised edition of it. It also contains "notes on prominent paint materials," all of which is worthy of a thorough reading. The fact is, "that which was spoken in the ear in closets" years ago is now "proclaimed from the housetops," and "he that runs may read." It is an age of literature on every subject under the sun; and he who stands zealous guard over trade secrets to-day is simply a relic of a prehistoric age and a pitiable object wrapped up partially in his own scanty information, with his ignorance sticking out in spots. The divine is blind who cannot see "sermons in stones, books in the running books, and good in everything;" the mechanic with open eyes as he goes through this world has "more understanding than all his teachers." Better pictures and literature are underfoot than graced the walls and tables of our grandfathers' libraries.

Out of 160 cars of passenger equipment that had gone out of B. & M. shops up to Dec. 1, classified and renumbered, but 12 retained the same number, happening to be of the right length and class. There are so few that happen thus and the new figure is so radically different from the old, all numbers are stricken out and put on with the new figure for the sake of uniformity in this particular. All interior numbers hitherto on the top rail of doors are erased and put on the finish at the right hand side of doors looking out and above the end windows. For this a two-inch gold figure of the Roman type is used. The name or initials of the road are erased from end deck-panels and left blank, "Boston & Maine" appearing in the middle rail of end doors in ornamental fashion. The word "Smoker" appears in gold Roman letters outside across the panels under the end windows at each passenger entrance to that class of car. Heretofore it was stenciled in yellow paint on the top-riser of steps. These changes have been made necessary by the Fitchburg lease, whose cars were so constructed in some points that B. & M. standards could not well be carried out. All these changes will be made and the entire equipment probably cleaned and varnished by June 30, resulting in more uniformity than formerly. With changes in letter-board lettering and some striping it will not be long before the equipment will be entirely uniform and much improved in appearance.

I understand that Mr. Edward Webb has severed his connection with the Laconia Car Company as foreman painter, and that he is succeeded by Mr. Ezra Page, a local house, sign and decorative painter, and brother of Mr. T. F. Page, who was formerly with the Laconia Car Company in the same capacity, and whom Mr. Webb succeeded. Mr. Ezra Page some years ago had "the Western fever" and, we believe, reached the Pacific coast and worked for a time with Mr. W. C. Fitch, of the Southern Pacific, if we are rightly informed. Mr. Webb had been with the Laconia people upward of twenty years.

The Boston & Maine put through its various shops for cleaning, painting and varnishing 199 cars of its passenger equipment during the month of January, 1901. These were all renumbered; 35 were painted throughout; 53 were "cut in," and 58 were varnished inside. For the seven months ending Jan. 31st, the same road had painted 2,380 cars of its freight equipment. The balance of its passenger equipment—762 cars—will be completed for the year ending June 30th next.

The veteran varnish drummer, "Dave" Thompson, called on me January 10. He has been at it thirty-five or more years, and probably sold the first gallon of Murphy Varnish in New England. For years he represented C. Schrack & Co., Philadelphia, and is now "in for life" with the Standard. Many years ago he was with Wood Bros., carriage painting, in New York City. As he canvasses the carriage trade chiefly he is not so well known to car men, but thinks he will be able to meet us at Buffalo Convention in September. If so he will be entitled to honors, for, as a varnish man, he was at the first convention when our association was formed, November 6, 1870, at Preble Hall, Tremont street, Boston.

Benson E. Brown, familiarly known among our fraternity as "Brownie," has severed his connection with the Brown-Lilly Company and returned to his old love, the Acme White Lead Works, of Detroit. The Acme Company has, of course, killed the fatted calf on the return of the prodigal, and it had no other son who was jealous of the reinstatement.

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

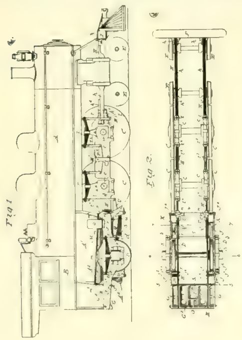
A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

Locomotive

No. 667,340.

JAMES E. SAGUE, of Schnectady, N. Y.

The combination of the driving-wheels, their axles and axle-boxes, the trailing wheels, their axle and axle-boxes, the front side pieces, the rear side pieces secured to the rear ends of the front side pieces and extending over the axles of the drivers and trailers to the rear end of the track, the outside frame-pieces extending over the boxes of the trailing wheels and arranged outside the trailing wheels, means for connecting the outside frame-pieces to the rear side pieces, a cross-frame in rear of the trailers, to which the rear ends of the rear frame-pieces are secured, and a fire-box extending over the trailing wheels and supported on the outside frame-pieces.

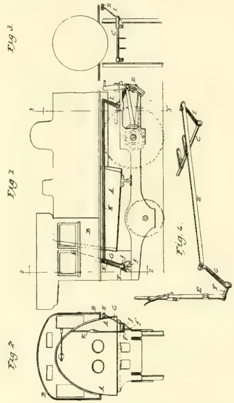


Locomotive

No. 667,341.

JAMES E. SAGUE, of Schenectady.

The object of my present invention is to provide improved means for connecting the reversing-lever with the tumbling-shaft of the link-motion in such manner that the cab may be located at the rear end of the locomotive. This is accomplished by connecting the lower end of the reversing-lever to a short shaft or fulcrum-pin, to which is also attached an arm extending upwardly therefrom and at its upper end jointed to a reach-rod, the front end of which is jointed to an arm extending upwardly from the tumbling-shaft of the link-motion. Preferably the arm on the fulcrum-pin is inclined, so as to extend both upwardly



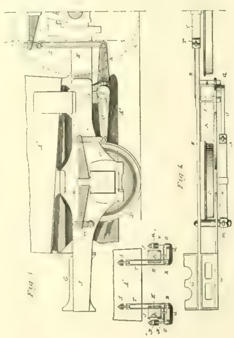
and outwardly therefrom, and the arm on the tumbling-shaft is also preferably inclined, so as to extend both upwardly and outwardly therefrom.

Locomotive

No. 667,343.

JAMES E. SAGUE, of Schenectady.

The combination of the driving-wheels, their axles, the axle-boxes thereof arranged inside the wheels, the trailing wheels, their axles, the axle-boxes thereof arranged outside the wheels, springs attached to the axle-



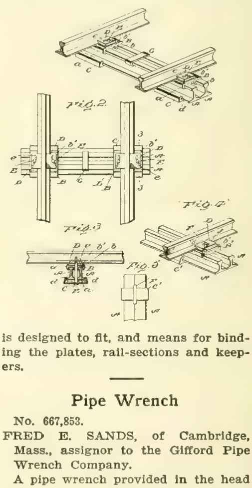
boxes of the driving-wheels and to the axle-boxes of the trailing wheels, the truck-frame, short rock-shafts arranged in bearings attached to the truck-frame, levers projecting from the outer ends of said rock-shafts and connected with the front ends of the springs of the trailing wheels, levers projecting from the inner ends of said rock-shafts and connected with the rear ends of the springs of the rear driving-wheels, a fire-box and an ash-pan projecting forwardly of the trailing axle and having a maximum area in front of the trailing axle.

Railroad-Tie

No. 667,405.

MORRIS T. SCHAFFER, of Bethlehem, Penn.

A railroad-tie composed of track-sections, plates in which such sections rest, keepers mounted on such track-sections formed with depending portions on their under sides between which the tread of each track-section



is designed to fit, and means for binding the plates, rail-sections and keepers.

Pipe Wrench

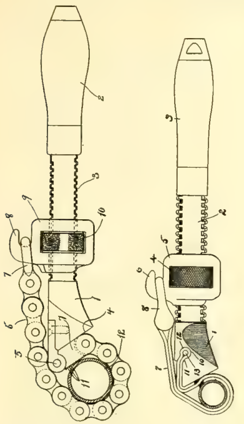
No. 667,853.

FRED E. SANDS, of Cambridge, Mass., assignor to the Gifford Pipe Wrench Company.

A pipe wrench provided in the head thereof with a transverse recess or groove having an open end and an enlarged body and a contracted neck, the front and rear walls of said recess being integral with the head, and a flexible pipe-encircling member attached to the head by being doubled to make a bight or fold within said recess, and a retaining-pin inclosed by said bight within the body of the recess and acting to expand the bight therein.

No. 667,852.

1. A pipe wrench having a frame with the transverse terminal face 4 and a screw-threaded shank, the hinge 5, located at one end of and projecting beyond said face, the chain 6, having the link 7 attached to said pivot and ar-



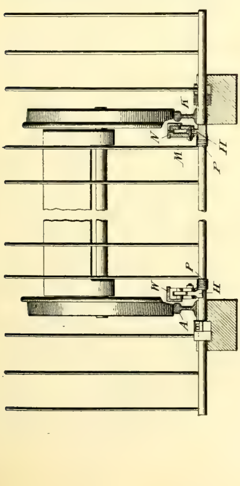
ranged to lie across the said terminal face, and a locking member at its other end, a nut on said shank, and a saddle embracing said nut and having a locking member adapted to engage the locking member on the chain and located on the same side of the frame as the hinge 5.

Cattle Guard

No. 667,256.

WILLIAM E. SHAFFER, of Nittany, and JOHN W. WHIPPO, of Bellefonte, Penn.

A train approaching the guard, the flanges of the wheels of the locomotive will strike against the end of the angle-irons on opposite sides and impart a slight longitudinal movement simultaneously with the depressing of the angle-irons. As the angle-irons are depressed the shafts are rocked and the guard is turned down to a horizontal position and remains in such position until the train passes over the angle-irons, after which the springs will rock the shafts back to their normal positions and the guard will return to an upright position, forming a gate closing the entrance to the tracks at a crossing.

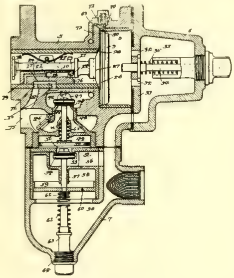


Triple Valve

No. 667,355.

GEORGE W. WILDIN, of Savannah, Ga., assignor of one-third to Wilson E. Symons, of same place.

In a fluid-pressure brake apparatus, a service auxiliary reservoir, an emergency auxiliary reservoir, a brake-cylinder, a valve device for establishing communication between the service



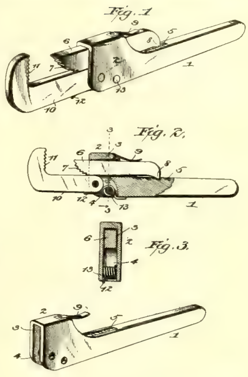
auxiliary reservoir and the brake cylinder upon a reduction in train-pipe pressure and means movable independently of said valve device for communicating the emergency auxiliary reservoir with the brake-cylinder upon a further sudden reduction in train-pipe pressure.

Wrench

No. 667,743.

THOMAS E. SMYTHE, of Galion, O.

In a wrench, the combination, with a handle, the head of which is slotted longitudinally and the handle adjacent thereto is provided with forwardly-extending teeth, of a jaw pivotally secured within the slotted portion of the handle, the free end of which is bent at an angle and provided on its inner face with teeth, a spring secured within the slotted portion of the head, one end of which engages with said jaw and normally forces it forward, longitudinally - movable jaw within the slotted portion, the under side of the rear end of which is provided with a projection for engaging with the teeth of the handle, and spring secured to the head in position to engage the rear



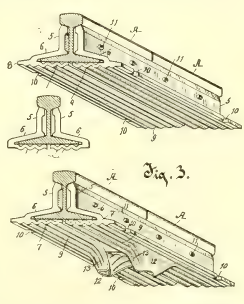
end of said sliding jaw and normally hold its projection in engagement with the teeth of the handle.

Rail-Joint

No. 667,499.

RICHARD B. CHARLTON, of Milwaukee, Wis., assignor to the Continuous Rail Joint Company, of America.

A joint-plate for railway-rails, comprising integrally, an upright member, an oblique member continuous from the lower edge of the upright member and adapted to rest on the upper surface of the base of a rail, a foot member continuous of and turned under an oblique member, the foot member being corrugated longitudinally, and a girder medially of the foot member, the girder



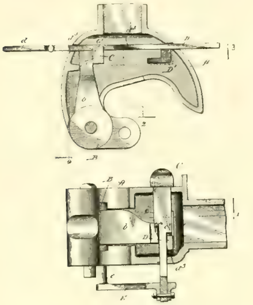
being formed of material of the corrugated foot member turned downwardly from its inner edge and flattened out, the girder exceeding in height the width of that portion of the foot member of which the girder was formed.

Car-Coupling

No. 667,427.

CHARLES DIETZ, of Chicago, Ill.

In a car-coupler of the class described, the combination of a draw-bar head, a coupling-knuckle pivotally secured in the same and provided with a rearwardly-extending tail portion, a



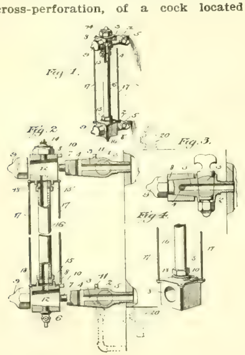
locking-pin arranged to move in a vertical plane and adapted to unlock or permit the coupling-knuckle to be unlocked, and a sliding bar arranged to move transversely of the draw-bar head and in a horizontal plane provided with a cam-surface arranged to contact the coupling-pin and elevate the same to permit the coupling-knuckle to be unlocked and with a portion arranged to be contacted by the coupling-knuckle during its unlocking movement to return it to its initial position.

Water-Gage

No. 667,247.

JAMES O'BRIEN, of New York, N. Y.

In steam and water gage for boilers, the combination, with two valves, each of which is bored longitudinally and provided near its outer end with a cross-perforation, of a cock located



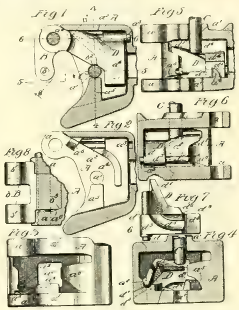
transversely of the bore, of stuffing-boxes, on the outer ends of said valves, each of which is provided with a transverse perforation to register with the cross-perforation of the valves, a gland in each stuffing-box, guard-rods for holding the snuffing-boxes apart, and means for holding the boxes upon the valves.

Car-Coupling

No. 667,710.

WILLIAM K. KIGHT, of Poplar Bluff, Miss.

The combination with a coupler-head, and knuckle pivotally mounted therein, said head and knuckle having co-ope-



rating inclined faces tending to cause the knuckle to swing outwardly when released, of a rocking block mounted in said head and acting by gravity to assist said inclined faces to cause the knuckle to swing outwardly.

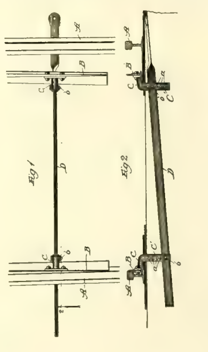
Railway-Switch

No. 667,637.

AXEL A. STROM, of Austin, Ill., assignor to the Strom Manufacturing Company, of Chicago.

In a railway-switch, the combination with the switch-rails of a connecting medium between them, adjustable by raising and lowering it in a vertical plane along a vertical extension from the rail to set the gage.

2. In a railway-switch, the combination with the switch-rails of a tie-bar connecting them and adjustable by raising and lowering it in a vertical plane along a vertical extension from the rail to set the gage.

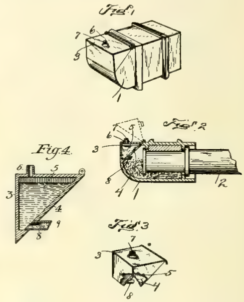


Car Axle Lubricator

No. 668,059.

WILLIAM N. SHEEHAN, of Salem, O.

The combination of a car-axle box, a lid hinged thereto, and the lid pro-



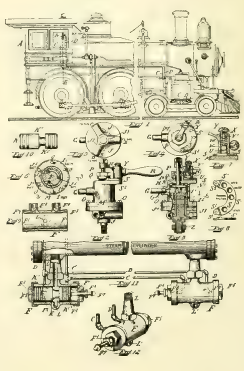
vided with an auxiliary oil-chamber separated by an inclined bottom from the axle-box, a tube leading from the inclined bottom of the auxiliary oil-chamber, and the tube normally closed by material capable of melting at a low degree of heat.

Steam-Cylinder Drain-Valve

No. 667,244.

HENRY W. M'COMBS, of Boston, Mass.

An improved steam-cylinder drain-valve for exhausting the surface con-



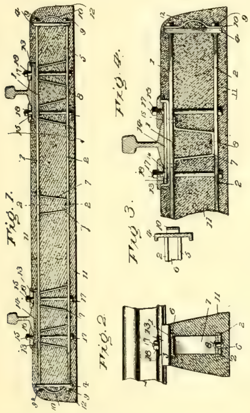
densation from steam remaining in said cylinders, the right and left inclining ducts provided in the wall thereof to admit and eject air or steam, means for conducting the actuating medium from the engine, the piston-chamber adapted to receive said medium, the vertical central inlet-passage connecting with the steam-cylinder, the drain-vent immediately beneath the inlet-passage and means reciprocating within said piston-chamber to control the inlet and outlet passages.

Composite Railway-tie

No. 667,698.

CHARLES HARRELL, of Bainbridge, Ga.

A composite railway-tie comprising a metallic framework consisting of upper and lower bars having vertically-disposed bolts passing through said bars and connecting them together, rail-supporting plates resting upon said framework and through which said bolts pass, and rail-securing devices retained by said bolts.

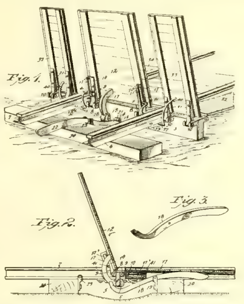


Cattle-Guard

No. 667,757.

WILLIAM R. ALLEN, of Hoquiam, Wash.

A cattle-guard comprising a supporting-beam, gates pivoted to the beam and lying at opposite sides thereof, connections between one gate at one side of the beam and the oposite gate at the other side of the beam for raising one gate when the other is depressed, and a rock-shaft disposed beneath each of the side edges of each of said opposite, connected gates and the side edge of the next gate on the same side of the beam, said rock-shafts having arms, one arm of each shaft having slidable connection with its respective first-named gate and the other arm resting against the under side of the said next gate on the same side of the beam, whereby, when one gate at one side of the beam is depressed, the other gates at the oposite side will be raised.

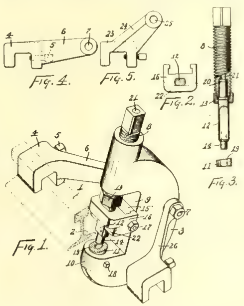


Rail-Piercing Machine

No. 667,258.

FRANK J. J. SLOAT, of Hamilton, O.

In a rail-piercing machine, the combination, substantially as set forth, of a clamp adapted to be fixed to the head of the rail, an arm projecting from the clamp, a pin projecting from the extremity of the arm parallel with the rail, a gapped body independent of said clamp and swiveled upon said pin, and a piercing-tool mounted in said body.

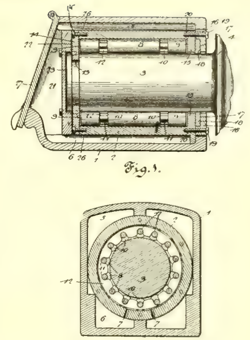


Journal-Box

No. 667,470.

FREDERICK G. WARD, of Avalon, Penn.

In a device of the class described, the combination of a journal-box having a sleeve provided at its inner end with a flange, a journal 3 having an extended portion provided with a groove, a sectional check-plate interlocked with the groove and arranged at the outer end of the sleeve, a cap secured to and concealing the check-plate and the extended end of the journal, the flat-ended rolls arranged within the sleeve and provided between their ends with grooves, and spacing-rings engaging the grooved portions of the rolls.

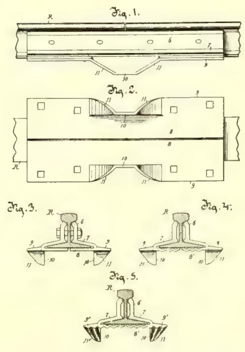


Railway-Rail Joint

No. 667,501.

RICHARD B. CHARLTON, of Milwaukee, Wis., assignor to the Continuous Rail Joint Company of America.

A rail-joint plate for railway-rails, constructed integrally of metal, comprising an upright member, a laterally-extending foot member, an under inwardly-extending base member, a toe member projecting laterally from the foot member and the base member in the plane of the base member, and a girder medially of the length of the plate formed of a turned-down portion of the toe member and disposed below the plane of the base member and substantially below the line of junction of the base and the toe members.



PERSONALITIES.

Wm. Schmalzried has been appointed foreman of car department of the Texas & Pacific Railway, at Fort Worth, Tex., vice T. F. White, deceased.

D. J. Timlin has been appointed master mechanic of the Texas Central, with office at Walnut Springs, Tex., in place of W. B. Warren.

James J. Armstrong, of Chicago, has been appointed traffic manager of the Shelby Steel Tube Company, with offices in Cleveland. Mr. Armstrong was for many years chief clerk of the railway mail service in Chicago.

C. H. Putnam has been appointed superintendent of shops of the Great Northern at Spokane, Wash., in place of J. A. Steele, resigned.

S. S. Neff, who, since May, 1900, has been consulting engineer of the Boston Elevated Railway, has been appointed superintendent of that road, with office at Boston, Mass. Mr. Neff was superintendent of the Union Elevated Railroad of Chicago from October, 1897, to May, 1900, and previously was superintendent of the coast lines of the Great Northern Railway.

W. O. Jacquette, formerly Comptroller of the Pressed Steel Car Company, with office in New York, has been appointed district manager, with headquarters in Chicago.

Rolla Wells, president of the American Steel Foundry, was recently nominated, unanimously, as democratic candidate for mayor of St. Louis. It is a reasonable inference from this that the democratic party in St. Louis is a much cleaner institution than it is in, say, New York or Chicago.

Walter W. Hodgkins has been appointed assistant master mechanic of the Fitchburg division of the Boston & Maine, with headquarters at Mechanicsville, N. Y., in place of Edward Elden, resigned, to become master mechanic of the St. Louis division of the Toledo, St. Louis & Western. Henry C. Manchester has been appointed master mechanic at Worcester, Mass., in place of Mr. Hodgkins.

T. F. Brady has been appointed master mechanic of the Mexican Central at Chihuahua, Mex., in place of H. W. Ridgway, resigned.

C. P. Petriken, of Macon, Ga., has been appointed master mechanic of the Southern Railway, at Princeton, Ind.

H. M. Perry, formerly general superintendent of the Pullman works, and later general manager of the Madison Car Company, and subsequently mechanical engineer with the American Brakebeam Company, has opened an office at 1023 Monadnock block as expert in car construction. Mr. Perry will make drawings and specifications for new car equipment of all classes, appraisals of second-hand cars, inspection and tests of material and investigation of railway specialties. He is author of the well known text-book, "Cost of Car Repairs."

John G. Sanborn and Louis Turivas have formed the American Railway Supply Company, with offices at 402 Monadnock Block, Chicago. The company will handle the Walsh brakeshoe, Waters' A. B. C. track sander, Sullivan metallic packing and the Acme sight feed engine truck cellar and oil cup. Mr. Sanborn was, until recently, manager of the works of the American Brake Beam Company.

C. W. Lee has been appointed master mechanic of the Seaboard Air Line, with headquarters at Fernandina, Fla.

A. L. Ingalls, son of President M. E. Ingalls, of the "Big Four," road, has been appointed superintendent of the Cleveland and Indianapolis division of that road, with offices in Cleveland. He succeeds T. J. Higgins, who has been appointed general agent of the "Big Four" Company in Cleveland.

Henry Bitters has been appointed master car builder of the Duluth, South Shore & Atlantic, with office at Marquette, Mich., in place of Mr. D. C. Mulvihill, resigned, to accept service with another company.

J. E. Muhlfeld, master mechanic of the Grand Trunk at Fort Gratiot, Mich., has been appointed master mechanic in charge of the locomotive works at Montreal, Que., in place of A. G. Elvin, who recently resigned to accept a similar position with the Delaware, Lackawanna & Western. E. D. Jameson has been appointed master mechanic of the western division, with headquarters at Battle Creek, Mich., with jurisdiction over all matters pertaining to the mechanical department excepting those at Fort Gratiot shops and at the Port Huron tunnel pumping station. J. McGrath has been appointed master mechanic in charge of the Fort Gratiot shops and Port Huron and Sarnia pumping stations, with headquarters at Fort Gratiot, Mich.

Angus Brown, formerly superintendent of motive power of the Wisconsin Central, has been appointed superintendent of motive power of the Chicago Terminal Transfer Company, with headquarters at Chicago.

E. G. Russell, late general superintendent of the Delaware, Lackawanna & Western, has been appointed general manager of the Intercolonial Railway, with headquarters at Moncton, N. B. Mr. Russell resigned from the Delaware, Lackawanna & Western on September 1 last.

Onward Bates, engineer and superintendent of bridges and buildings for many years of the Chicago, Milwaukee & St. Paul Railway, has resigned his position, to take effect April 1. After quitting railroad service Mr. Bates expects to engage in private business.

Charles L. Sullivan has resigned as superintendent of the Cloud Steel Truck Company, and has opened an office at 1515 Old Colony building, Chicago, to engage in the sale of railway supplies, including the "Handy" car described elsewhere in this issue.

R. Williams, superintendent of the Indiana, Illinois & Iowa until recently, has taken service with the Delaware, Lackawanna & Western as superintendent of terminals, at Buffalo, N. Y.

A. G. Elvin, formerly master mechanic of the shops of the Grand Trunk Railway system at Montreal Que., has been appointed assistant superintendent of motive power of the Delaware, Lackawanna & Western Railroad.

D. J. Timlin has been appointed master mechanic of the Texas Central Railway, with headquarters at Walnut Springs, Tex., succeeding W. B. Warren.

R. M. Boldridge has resigned as master mechanic of the St. Louis-Louisville lines of the Southern Railway.

Carl Hagen, who has been general foreman of the shops of the Wheeling & Lake Erie Railroad, has been made master car builder of the entire system.

C. W. Lee, foreman of locomotive repairs of the Southern Railway, at Greensboro, N. C., has been appointed master mechanic of the Seaboard Air Line at Raleigh, N. C.

OBITUARIES.

M. M. Martin, superintendent car department of the Wabash Railroad, died at his residence in Litchfield, Ill., on February 12, at the age of sixty-nine years. He was born in England in 1831, and entered railway service in 1851 as foreman of the Michigan Southern & Northern Indiana at Adrian, Mich., which position he held for seven years. From 1858 to 1865 he was master car builder of the St. Louis, Alton & Terre Haute, and from 1865 to 1872 master car builder of the Ohio & Mississippi. He was then, for one year, superintendent of the Indianapolis Junction, and for two years superintendent of the Litchfield Car Works at Litchfield, Ill. In 1877 he was appointed master car builder of the southern lines of the Illinois Central at McComb City, Miss., and held that position for two years. From 1880 to 1884 he was vice-president of the Litchfield Car & Machine Company, and had been superintendent of car department of the Wabash since 1884.

E. W. Jerome, at one time assistant master mechanic of the Panama Railway, and later master mechanic of the Zanesville & Ohio River Railway, died recently at Albany, N. Y.

Edward Darley, treasurer of the Technical Club, of Chicago, died suddenly at Chicago Beach Hotel on Saturday, Feb. 16. He was under an anesthetic for the purpose of having an operation performed on his throat, and never recovered consciousness. Mr. Darley has for several years represented the Cahill, Babcock and Wilcox boilers, with offices in the Rookery building.

The Air Brake Association

The following is an official announcement of the subjects selected for discussion and the committees appointed to report on them at the Eighth Annual Convention, to be held in Chicago, Ill., April 30, 1901:

"Unconnected Hose Hanging Free Versus Coupled with a Well-Designed and Located Dummy Coupling."—H. H. Forney, chairman; G. S. Hale, T. A. Hedendahl, John Dickson, H. C. Frazer.

"Air Pump Exhaust for Passenger Train Heating."—Frank F. Coggin, chairman; E. G. Desoe, Chas. S. Hall, T. A. Hedendahl.

"The Pressure-Retaining Valve: Its Value, Present General Condition and How It May Best Be Improved and Maintained."—G. R. Parker, chairman; J. H. Stricklan, E. Kronberg, W. L. Clendenen, C. R. Ord.

"Terminal Test Plants; Why and Where Needed; Best Methods of Installation and Operation."—S. D. Hutchins, chairman; W. T. Hamar, Otto Best, C. C. Farmer, W. P. Huntley, Jr.

"Revision of Progressive Form of Questions and Answers."—F. M. Nellis, chairman; R. C. Augur, J. P. Kelly, C. C. Farmer and M. E. McKee.

The Car Foremen's Associations

CHICAGO.

The regular meeting of the Car Foremen's Association, of Chicago, was held Wednesday, Feb. 13, about eight members being present. Thirty-seven new members were taken in, which brings the membership past the 400 mark.

Question No. 1.—"Is a joint evidence card covering two draft timbers and one deadwood, signed by a switching road and a railroad, proper authority for rendering bill by another switching road which makes repairs some time later, at which time numerous other repairs are made indicating rough usage, the car having been delivered back and fourth three times in the interim?" was discused in all its phases and occupied the larger part of the evening. It was at last decided, however, that the card as procured was proper authority for bill.

The subject, "Is the use of the cotter pin in the knuckle pin necessary or desirable?" made an interesting discussion, and it was decided that the cotter pin was necessary. This decision assisted in deciding the question following: "If a foreign car is received with a knuckle pin so short that a cotter pin could not be applied, should a longer knuckle pin be applied? If so, what authority is necessary for bill?" It was decided that proper repairs should be made and bill rendered against owners, and a joint evidence card procured and sent to the owners for their protection.

Mr. Shannon's paper on loose draft rigging and neglected bodies of cars was not read, owing to the lateness of the hour, but was ordered to be printed in the proceedings.

CLEVELAND.

The monthly meeting of the Car Department Foremen's Association, of Cleveland, O., was held Saturday, Feb. 23, President Berg in the chair.

Subject for discussion: "If a foreign car is received with spindle couplers, and one of the spindles is of improper dimensions, how should it be treated?"

After considerable discussion it was found to be the sense of the meeting that the proper practice would be to remove the spindle of improper dimensions, and apply a proper spindle, billing car owners for same.

No. 2.—"What is the proper charge for replacing missing half door on a refrigerator car on defect card?"

All agreed that the actual cost of replacing the missing half door should be charged.

No. 3—"What would be the proper charge for journal bearings applied to B. & A. cars? These cars have collarless journals, size 4½ inches by 7⅝ inches; the bearing weighs 17½ pounds."

After some discussion the sense of the meeting was that, as a matter of equity, a charge for the actual weight of such special-size bearings should be allowed, but, according to the Rules and arbitration case 440, a charge of 10 pounds with credit of 5 pounds is proper.

The question as to whether replacement of missing half door on refrigerator car by company handling car was chargeable to owners was decided in the affirmative.

National Hollow Brakebeam Patents Upheld

The case of the National Hollow Brakebeam Company, of Chicago, against the Interchangeable Brakebeam Company, of St. Louis, was recently decided by the District Court of Appeals in favor of the former, on appeal from a lower court, reversing the decision of Judge Adams, given in favor of the Interchangeable Company about a year ago.

The present decision upholds the claims of the Hien patent, covering the flexible camber of the National Hollow brakebeam.

MISCELLANEA

The Pressed Steel Car Co., of Pittsburgh, Pa., has received an order for pressed steel body and truck bolsters for 1,000 freight cars now being built by the Pullman Company for the Rutland Railroad. Seven hundred and fifty of these cars are 60,000 pounds capacity, and 250 are of 80,000 pounds capacity.

The Lehigh Valley officials have specified Pullman wide vestibules, standard steel platforms, Westinghouse air and signal apparatus, Pullman air pressure water system on the cars being built for them by the Wason Manufacturing Co., the Jackson & Sharp Co. and the American Car & Foundry Co.

The Pyle electric headlight on five engines now building at the Manchester Locomotive Works will soon illuminate the tracks of the Ohio River Railroad Co.

The Pullman Company is building 600 box and 250 coal cars for the Rutland Railroad Co., and these cars, when completed, will have pressed steel bolsters, Tower couplers, Chicago roofs and Sterlingworth brake beams.

The N. Y. C. & H. R. intend to use Scarritt seats, Gould platforms, Pintsch gas and Westinghouse brakes and train signal on the fifty new passenger cars which the Harlan & Hollingsworth Company is building for it.

The New York air brake, Chicago roof, and Wagner doors will be used upon the 250 box cars which the Louisville and Nashville Railroad is building in its own shops, and also upon a similar number of cars being built for that road by the Mount Vernon Car Manufacturing Co.

The Illinois Central's new forty-ton box cars, building at the American Car & Foundry Co.'s works, will have Fox & Kindl trucks, Common sense body-bolsters, Monarch brake beams, and Thornburg coupler attachments.

H. D. Norris has been appointed purchasing agent of the Pere Marquette Railroad, with office at Saginaw, Mich.

An order for pressed steel body and truck bolsters for 500, 80,000-pounds-capacity cars for the Pittsburg Coal Co. has been received by the Pressed Steel Car Co., of Pittsburgh, Pa. The cars are being built by the Illinois Car & Equipment Co.

The Lake Shore & Michigan Southern Ry. has ordered 1,500 freight cars of 80,000 pounds capacity, from American Car & Foundry Co. Contract specifies that pressed steel body and truck bolsters should be used in their construction. The bolsters will be furnished by the Pressed Steel Car Co., of Pittsburgh.

The new plant of the Seamless Steel Tubes Company at Detroit, Mich., is in operation, and has a capacity of 10 tons of finished tubes daily.

Record of New Equipment

Ordered during the Month of February 1901

CARS

Ordered by	No.	Class.	To be built by.
Bellingham Bay R. R..	10	Flat.	Own shops.
B., R. & P. R. R.....	500	Coal.	Am. Car & Fdry Co.
C., B. & Q. R. R.....	500	Coal.	Ill. Car & Eqt. Co.
" " "	1,000	Stock.	Am. Car & Fdry. Co.
" " "	5	Dining.	Pullman Co.
Choc., Olka. & Gulf...	6	Passenger.	Am. Car & Fdry. Co.
Chi. Gt. Western.....	70	Flat.	" " " " "
C., L., S. & E. R. R...	150	Steel.	Pressed Steel Car Co.
Duerr Constr'n Co.....	60	Freight.	Am. Car & Fdry. Co.
El Paso & N. E......	50	Coal.	" " " " "
" " "	25	Box.	" " " " "
" " "	6	Tank.	" " " " "
Grand Rapids & Ind..	100	Gondola.	Own shops.
Gt. Northern	3,600	Box.	Haskell & Barker Car Co.
" "	3,000	Coal.	" " " " "
General Chem'l Co....	20	Tank.	Am. Car & Fdry. Co.
Illinois Central	1,000	Box.	" " " " "
Ind., Ill. & Ia.........	500	Coal.	" " " " "
Lehigh Valley R. R....	7	Passenger.	Wason Mfg. Co.
" " "	4	Passenger.	Jackson & Sharp.
" " "	9	Passenger.	Am. Car & Fdry. Co.
Louis. & Nash. R. R..	250	Box.	Mt. Vernon Car Mfg. Co.
" " " ..	250	Box.	Own shops.
L. S. & M. S.........	1,500	Coal.	Am. Car & Fdry. Co.
Mich. Cent...........	1,000	Box.	" " " " "
" "	1,000	Furniture.	" " " " "
McIntosh, H. M......	100	Refrigerator.	" " " " "
Nevada, Cal., Ore.....	2	Coal.	" " " " "
" " "	4	Passenger.	" " " " "
North. Pac............	450	Stock.	So. Balt. Car Works.
N. Y. C. & H. R.....	50	Passenger.	Harlan & Hollingsworth.
Ohio & Little Kana...	10	Freight.	Am. Car & Fdry. Co.
Pere Marquette	5	Passenger.	" " " " "
" "	10	Caboose.	" " " " "
Pitts., Shaw. & Nor...	550	Coal.	" " " " "
Rutland R. R.........	250	Coal.	Pullman Co.
" "	600	Box.	" "
South. Pac............	500	Tank.	Am. Car & Fdry. Co.
Wheeling & Lake Erie.	500	Coal.	So. Balt. Car Works.

LOCOMOTIVES

Ordered by	No.	Class.	To be built by.
B. & O. R. R.........	40		Int'l Power Co.
" " "	10	Switching.	Rich. Loco. Works.
Black Hills & H. P...	4		Baldwin Loco. Works.
Boston & Maine......	6		Manchester Loco. Works.
Canadian Pacific	12	Switching.	Own shops.
C. & E. I.............	16		Schenectady Loco. Works.
C., L. S. & E.........	3	Switching.	Pittsburgh Loco. Works.
C., M. & S. P........	34	C. 10-w. frt.	Baldwin Loco. Works.
" " " "	9	C. Atlantic.	" " "
" " " "	4	Cons'l'd'n.	" " "
Colo. & South.........	15	Freight.	Int'l Power Co.
Grand Trunk	8	10-wheel.	Own shops.
" "	2	Mogul.	" "
K. C., Ft. S. & M....	2	Passenger.	
L. S. & M. S.........	11	Passenger.	Brooks Loco. Works.
" "	40	Freight.	" " "
M., K. & T...........	12	Freight.	Baldwin Loco. Works.
" " "	5	Passenger.	" " "
North. Pac.	20	Switching.	Schenectady Loco. Works.
" "	5	Passenger.	" " "
N. Y., Phila. & Nor...	2		Baldwin Loco. Works.
Ohio River	5		Manchester Loco. Works.
Oregon Short Line....	5	Switching.	Cooke Lo. & Mac. Wks.
Virginia Coal & Iron..	1		Baldwin Loco. Works.
Wabash	20		Richmond Loco. Works.
Western Maryland ...	10	Freight.	Baldwin Loco. Works.
Wheeling & Lake E...	6	Switching.	Pittsburgh Loco. Works.
" " " ...	4	Cons'l'd'n.	" " "
" " " ...	10		" " "
White Pass & Yukon..	2		Baldwin Loco. Works.

The Chicago rabbeted grain doors, manufactured by the Chicago Grain Door Company, have been specified on the 1,000 box cars recently ordered by the Illinois Central of the American Car & Foundry Company.

More-Jones brasses and McCord journal boxes will be used on the 2,000 freight cars ordered of the American Car & Foundry Company by the Missouri, Kansas & Texas, and 200 of these cars will be equipped with Monarch brake-beams.

The Sterlingworth Railway Supply Company has closed a contract with the Northern Pacific R. R. Co. for 17,000 brake beams for the 4,250 cars recently ordered by that road.

The Chicago, Rock Island & Pacific order, placed with the Pullman Company for 500 box cars, 34 ft. long, 60,000 lbs. capacity, are for May delivery. The specifications include Simplex body bolsters and Schoen trucks, Westinghouse air-brakes, Sterlingworth brake-beams, Janney couplers, Miner drawbar attachments, McCord journal boxes and Murphy roofs.

The Chicago, Lake Shore & Eastern has ordered 150 pressed steel cars from the Pressed Steel Car Company, to be delivered in August. They will be 43 feet 3 inches long over end sills, of 110,000 pounds capacity, and will have Schoen trucks, New York air brakes, Buckeye couplers, Miner draft rigging, Scott springs, McCord journal boxes, Universal bearings and Corning brakeshoes.

The Tropenas Steel Casting Manufacturers' Association of North America has been incorporated by William D. Sargent, Henry K. Gilbert and Paul Synnestvedt. General offices will be established at Chicago.

The Canadian Pacific Railway is using on the twelve switching engines which it is building at Montreal, Otis steel for fire box and boiler, Krupp crucible tires, Richardson pop valves, Crosby steam gauges, Michigan sight feed lubricators, U. S. metallic packing, asbestos air space sectional lagging, Westinghouse-American brake, Sterlingworth rolled steel brake beams and Leach sanders.

The six switchers and four consoldations being built at the Pittsburg Locomotive Works for the Wheeling & Lake Erie Railroad are to have carbon steel fireboxes, Ohio injectors, Keasby & Mathison lagging. The consolidations will have Franklinite tubes, while those of the switchers will be seamless. The forty-ton coal cars being built for the same company at the South Baltimore Car Works have specified simplex bolsters, Thornburg draw gear, and Westinghouse air brakes.

The Standard Pneumatic Tool Co., of Chicago, manufacturers of the "Little Giant" Air Tools and Appliances, have moved their New York offices from 619 Washington Life Building, to more commodious quarters at 611-612-613, of the same building, this being necessitated on account of the very great increase in their business in Eastern and foreign territory during the past few months. Shipments in this district will be made from New York, instead of from Chicago, thus expediting delivery of machines.

Colonel W. D. Ewing has been appointed Eastern manager of the Sterlingworth Railway Supply Company, succeeding C. H. Boaz as Eastern sales agent, with office at 256 Broadway, N. Y.

The 1,000 box cars ordered by the Illinois Central of the American Car & Foundry Company will be 40 feet long, and will be equipped with Westinghouse air brakes, Chicago couplers, Thornburgh coupler attachments, Scott springs, M. C. B. standard journal bearings (manufactured by the Hewitt Manufacturing Company), Chicago-Cleveland car roof, Chicago grain doors, Common Sense body bolsters and Kindl and Fox trucks.

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EDWARD A. PHILLIPS ALBERT G. GLOVER
GEORGE S. HODGINS, Editors

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Ventilation of Freight Cars

In the Digest for March we called attention to the necessity for the proper ventilation of freight cars for certain classes of goods. What we said has called forth the following remarks from the Crown Cereal Company of St. Louis, Mo.:

"We are pleased to note your article in reference to ventilation of freight cars. The damage to grain, hay and other farm products during transit, caused altogether from lack of ventilation, is inestimable. Frequently a cargo of grain is so badly damaged that it hardly pays the freight, and the railroad companies say, 'We have no better cars,' and so the loss is borne by the shippers. Should not the railroads provide proper ventilation? Are not their interests identical with those of their patrons, and is there not a law which provides for the protection of property while in their possession? It is claimed that there is a ventilator on the market that offers this safeguard against such damage, and does not increase the risk on the part of railroads, as the device prevents injury from rain, sparks, dirt and the sun, and is also proof against theft."

We have only this to add, that if shippers are demanding ventilated cars, and if they find that the way to prevent pecuniary loss to themselves is to have such cars, they will sooner or later have them. It is only a question, then, of who will provide such cars.

If the railroads do not provide them, some one else will, either the shippers themselves or outsiders who think they can see a profitable investment in the operation of a private line. There is money in the private car line for somebody no doubt, but after the experience which railroads have had in this direction it would seem to be a pity if the idea was permitted to extend. Although private ownership of cars does not here, as in Great Britain, hamper improved construction, yet it is very generally admitted that in the matter of repairs and maintenance railroad companies here pay altogether too high for somebody else's whistle.

One Great Point to be Learned about Electricity

We are assured that electricity will play a leading, if not the most important, part at the coming Pan-American Exposition at Buffalo this summer. The opening ceremonies are to be specially impressive. We are told that the special train carrying the President of the United States and his Cabinet from Washington to the Pacific Coast will be connected by telegraph with electrical apparatus in the Music Temple and this apparatus will be connected with the great electric generator in the Electricity Building. Direct telegraphic communication will be made at the same moment between the executive offices of the presidents of all of the republics of this hemisphere, and the Governor General of Canada, and the electrical apparatus in the Music Temple. At 2 o'clock, Buffalo time, by arrangement with the cable companies leading to South America, and with the telegraphic companies, and with the Atlantic cable companies, the presidents and rulers of all of the countries of the Western Hemisphere will be requested to touch an electric button in their offices, which will thus start a piece of machinery in the Exposition, and they will at the same time transmit a message of greeting at the opening to be read in the Music Temple.

All this will be very wonderful and very instructive; it will show that mankind has overcome great obstacles, and has devised machines which will unerringly obey the lightest touch of a hand thousands and thousands of miles away. The object of the exposition is not only to please, but to instruct, and now that electricity is taking such a prominent place in the factory, and as a means of propulsion on rapid-transit lines, as a means of spoken and written communication, and a light, heat and power-giving agency, it is to be hoped that the exposition authorities or those interested in exploiting various electrical appliances, will collect statistics and furnish the public with information regarding the effect which the electric current has upon the human body. Accidents due to electric shock are all too frequent, and the proper means of treating those accidentally shocked into insensibility cannot be too widely known. No less an authority than the Electrical Review has recently cast grave doubts upon the ability of the electric current to produce instantaneous death. With regard to electric executions of criminals, it says: "It is easy to argue on assumption, but it cannot be proved that the man shocked into coma in the electric chair is actually dead until every method known to science has been applied to resuscitate him." Such an attempt, we believe, has never been made. It is therefore in the manifest interest of the community at large that at an industrial exhibition such as the Pan-American will be, that not only the electrician but the foreman, workman, mortorman, lineman, and, indeed, the public generally should have ample means of receiving instruction as to how to treat men who, in the discharge of duty, have been accidentally though severely shocked by a current of electricity. If the current does not kill outright, then knowledge of how to treat an unconscious sufferer until medical aid can be procured is of the utmost vital importance to every man, woman and child in the land.

English Nomenclature

The busy railroad man who reads the Digest, which necessarily deals with British as well as American railroad and engineering matters, may be pleased to have his memory refreshed as to the terminology of our friends across the sea. The English truck is a bogie, and English freight trains are goods trains. Merchandise there is carried in wagons, where we use freight cars. Passengers, over the water, ride in carriages, here they travel in coaches. They do shunting in yards, while we switch, and logically enough their terminal employees are shunters, while American railways employ yardmen. Conductors are guards, engineers are drivers, smokestacks are chimneys, superintendents of motive power are locomotive superintendents, and "over there" the M. C. B. would be a carriage and wagon superintendent. We say of a device that it can be operated from the cab, they say operated from the foot plate. Our depots are their stations, and in this the applicability of the word they use is perhaps more appropriate, and with them ticket offices are still the old stage coach "booking offices." There the "L" roads are "Overhead"; while our switchmen are their pointsmen; our track is their permanent way, and our rails are their metals, in which case Americans are the more logical. Our street railways, whether they use "grip," "trolley," "motor," or are "surface" cars, are all with them described as "trams." In London the Metropolitan District Railway is spoken of as the "Underground," and the Central London Railway is familiarly known as the "Two-penny tube" (pronounced tuppeny), and indeed all their deep tunnel electric roads are generally spoken of as "tube railways."

LOCOMOTIVE CLASSIFICATION AND NOMENCLATURE

The story is told of an old lady who, seated in a railway carriage, in London, overheard a locomotive superintendent say to one of his subordinates, "When the racing begins next fall we will use only Single-Driver Bogies." The old lady was much alarmed, and was completely at a loss to comprehend why the company should wish to have the engines which were to make the fast runs from the metropolis to the Scottish highlands, manned by hobgoblins, who had the distinguishing peculiarity of never having entered into the holy state of matrimony. If the old lady had been afforded the opportunity of looking at the representation of the wheel arrangement of the engine which stands at the head of the series shown on the opposite page she would have seen that the terrible "single-driver bogie" was similar to the famous "bicycle" engines owned by the Philadelphia & Reading Railroad. We have, therefore, for want of a better word, ventured to take the name "Bogie" for the whole class of engines, which are built with a leading four-wheel truck. In this class, or series, are given seven existing types of engines, and we regret to have to acknowledge that there is among them "one vacant chair," which is represented by an engine of dots and dashes.

If the entire list of words now used in locomotive nomenclature had, all at once, like Minerva, sprung, fully armed, from the brow of Jove, we might have expected to have found a certain system followed in the terms employed. If our list of words had, at the present time, to be compiled by a committee, we might expect them to follow some such method as that adopted by the French *savants* who drew up the terminology of the metric system. They had a base, continuously and systematically modified, and they had to find words to suit. The meter being their standard, they used it in combination with Greek prefixes to denote the multiples, while Latin ones stood for the decimal parts. Our system, then, might, by some apt prefix, be made to denote the four-wheel truck feature, or the pony truck feature, and some suitable suffix might be made to indicate the presence of a pair of idle or carrying wheels at the rear. Our nomenclature, like our locomotive construction, is the result of a process of evolution, and the time seems to have arrived when the former may be examined with a view of arriving at some recognized system of classification.

To return to the single-driver bogie, at the head of the list. The Great Eastern Railway of England has some of this kind, running with liquid fuel apparatus (described elsewhere in our columns). The Philadelphia & Reading, however, called its engines of this type, without reference to the domestic condition of its locomotive engineers, "Single-Drivers," and this name is appropriate and at the same time has the advantage of being less terrifying to old ladies, at least than that used in the United Kingdom. The next in series is the well-known American type, now often better called the eight-wheel type. This engine is followed by the newer Atlantic type, of which the "Northwestern" and the "Chautauqua" engines are, as musicians would say, but variations played upon the same theme. The Atlantic type is succeeded on the list by the ten-wheel type. It is probably this engine for which Rudyard Kipling has suggested a name when, in describing the astonished admiration of the "American" engine, he says: ".007 had caught one glimpse of the superb six-wheel-coupled-racing-locomotive, who hauled the pride and glory of the road—the gilt-edged Purple Emperor, the millionaires' southbound express, laying the miles over his shoulder as a man peels a shaving from a soft board." The next type to this we have tentatively and arbitrarily called the "St. Paul," as it has no official type name, but was built by the Schenectady Works for the Chicago, Milwaukee & St. Paul Railway. After the "St. Paul" comes the twelve-wheel type, and next in the orderly series comes the faintly outlined "Phantom" type, which, as far as we have been able to ascertain, does not exist in the flesh—that is, in iron and steel. The last of the "Bogie" class is the Mastodon type, which logically ought to have been the fourteen-wheel type, because all through the series, up to this point, any type without the rear idle wheel has been some number of wheel type, the intervening forms being the Atlantic, "St. Paul" and the "Phantom." The Mastodon is perhaps the strangest type name of all. The word is usually applied to a line of extinct monsters of the elephant species, belonging to the Pleistocene period, whose grinding teeth had upon their surfaces little prominences which the name indicates. It was literally the "tit-toothed" animal. What this peculiar form of dentition signifies when applied to a locomotive engine is not apparent. In this connection it is, however, only fair to say that, as the "Phantom" type, or "missing link" in locomotive nomenclature, has not been discovered, yet from its place in the series, and from the form of its teeth, it will certainly be safe to look for it in the Psychozoic, or recent formations.

In the pony-truck class there are six well-defined existing types in series—the Columbia, Mogul, Prairie, "Calumet," (the latter called so, like the "St. Paul," for want of a better name, because built for the Chicago & Calumet Terminal Co. by the Brooks Locomotive Works). Lastly we have the Decapod, or ten-footed engine. This type does not necessarily have a total of ten wheels. It has ten power wheels, or ten crawling feet, the pony wheels acting as feelers, or we may say, antennae, in this species. Mr. S. M. Vauclain thus defined this type, in his paper on "Locomotives of the Nineteenth and Twentieth Centuries."

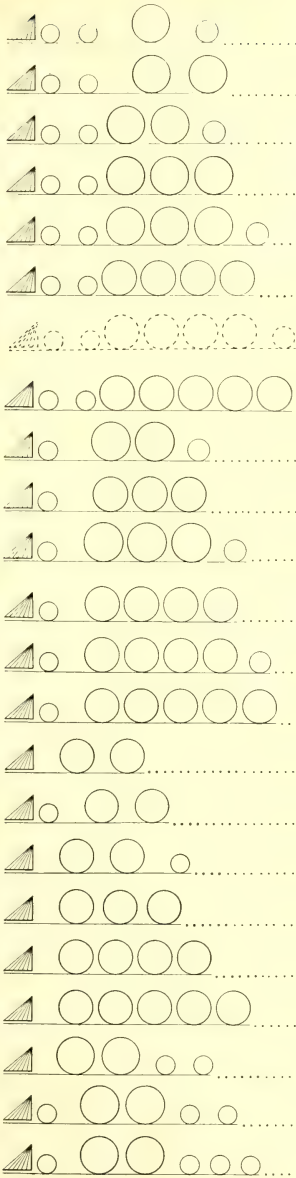
"The year 1885 marks the introduction of the Decapod, or locomotive with five pairs of coupled wheels and a pony truck."

In the switcher class six types appear, though this by no means exhausts the combinations which have been and can be made. The pilots shown in the illustrations are simply intended to indicate the front or cylinder ends of these engines, and to preserve a certain amount of symmetry in the entire series as drawn.

The two four-coupled switchers, one with leader and the other with an idler, are modifications of the four-wheel type, for which more distinctive names can easily be found. They are introduced to show that great variety no doubt exists, and can exist, among the members of this class.

The Forney class shows three principal types here, called respectively the original Forney, the Mogul-Forney and the Forney-Suburban. This list, however, does not necessarily exhaust the species.

The foregoing arrangement has in it some element of system. We find, however, upon consulting authorities, that all do not agree upon the exact meaning of the type names used. We find, for instance, in "Recent Locomotives," published by the Railroad Gazette, that a Baldwin engine built for service in the Sarnia tunnel for the Grand Trunk Railway, has the wheel arrangement of a ten-wheel switcher, as shown in our illustration. It is, on page 208 of that publication, called a Decapod. On the preceding page a Rogers engine, built for the C., B. & Q. R. R., with similar wheel arangement, is also called a Decapod, while on page 288 two Baldwin engines, with ten driving wheels and a pony truck, also bears, and we believe rightly, the name Decapod. The Brooks Locomotive Works catalogue for 1895 supports our representation of both Decapod and Mastodon. On page 267 of Recent Locomotives, an undoubted Prairie type is referred to as a Mogul. We also find that a little pamphlet issued by one of our contemporaries treats "Mastodon" and "twelve-wheel" as convertible terms. We call attention to these points simply to show that differences of opinion do exist as to the exact meaning which attaches to many of the terms used. There is uncertainty, not to say ambiguity, in some of the type names, and it would appear that a distinct advance in locomotive nomenclature would be made if the Master Mechanics' Association would give its sanction to the application of an official, definite and technical meaning to each type name, even if it does not wish to divide the series into distinct classes, as we have here done for convenience. Such a standardizing of nomenclature would be in accord with other similar lines of progress inaugurated by both the railway technical associations, which meet each year, in June. It may be worth while to mention that at the recent annual meeting of the American Railway Engineering and Maintenance-of-Way Association, the meaning of several terms was officially defined by the association. The words



Class	*Representation.* / *Type Name.*	*Whyte's System.*	*Total Wheels*
Bogie Class	SINGLE DRIVER	4-2-2	8
	EIGHT-WHEEL (*American.*)	4-4-0	8
	ATLANTIC	4-4-2	10
	TEN-WHEEL	4-6-0	10
	"ST. PAUL"	4-6-2	12
	TWELVE-WHEEL	4-8-0	12
	"PHANTOM" (*Non Existent.*)	4-8-2	14
	MASTODON	4-10-0	14
Pony Class	COLUMBIA	2-4-2	8
	MOGUL	2-6-0	8
	PRAIRIE	2-6-2	10
	CONSOLIDATION	2-8-0	10
	"CALUMET"	2-8-2	12
	DECAPOD	2-10-0	12
Switcher Class	4-WHEEL SWITCHER	0-4-0	4
	4-COUPLED SWITCHER	2-4-0	6
	4-COUPLED SWITCHER	0-4-2	6
	6-WHEEL SWITCHER	0-6-0	6
	8-WHEEL-SWITCHER	0-8-0	8
	10-WHEEL-SWITCHER	0-10-0	10
Forney Class	FORNEY (original)	0-4-4	8
	MOGUL-FORNEY	2-4-4	10
	FORNEY-SUBURBAN	2-4-6	12

"Masonry," "Yard" and "Terminal," now include certain specific things only, when used by the Engineering and Maintenance-of-Way people, and this fixing of a technical meaning in each case must of necessity avoid all ambiguity. We have been informed that in one instance, at least, the lack of definite interpretation of a class name led to a firm of locomotive builders bidding upon one type of engine and losing the contract, owing to the fact that the railway company, about to order, had in mind a different type, both parties using the same word, but applying it to different engines.

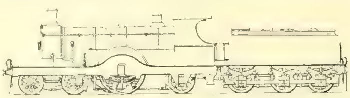
A glance at the total wheel column will show that in the entire series there are six engines having each eight wheels; there are also another six, each with ten wheels; there are five with twelve wheels, and, leaving out the "Phantom" type as at present non-existent, there is one with fourteen wheels. When to this is added the numerous combinations which may be made in the switcher and Forney classes, with engines of all kinds for special service, the need for something definite along these lines becomes apparent.

We have inserted a column indicating the various types by Mr. F. M. Whyte's system, in which it will be noticed that no type designation clashes with any other. This system, without dealing with such modifications as outside bearings or radial motion idlers, wide fireboxes or centrally placed cabs, describes the wheel arrangement, the whole wheel arrangement, and nothing but the wheel arrangement. The system is capable of easily spoken, written or printed expression; and, even if not adopted generally as the sole means of designation for engine types, may yet be very useful if appended, perhaps in brackets, following any type name which may be used in writing or telegraphing. By using the Whyte notation, the present, or even more appropriate type names may be preserved, and such expressions as "Chautauqua, 4-4-2" would at once become, if we may be allowed to say it, fundamentally intelligible to any railroad man who may see or hear it.

The Railroad Digest does not claim to have solved the whole problem, nor to have alone reached the goal of systematic arrangement in this matter. The subject is complicated, and types are many, and there are examples of types, once built and not repeated. We have not succeeded completely in, as Tennyson says,

> "Mastering the lawless science of our law
> That codeless myriad of precedent,
> That wilderness of single instances,"

but we have consulted authorities, and have tabulated the best results so far obtainable, simply with the view of focusing attention on this important question. We may not have set down all the known or existing forms of wheel arrangements, but with the best intentions we have modestly urged the question upon the consideration of those to whom a standardized nomenclature will certainly mean much.



FIRST AID TO THE INJURED

The Seaboard Air Line is willing to assist in the breeding of cattle and the raising of poultry, if we may believe current reports. The Illinois Central is prepared to show all and sundry how good country roads are to be made. Neither of these things, which are explained elsewhere in the Digest, are, strictly speaking, "railroading," but they may be good business. If they succeed they will bring grist to the railway mills. Many railways have organized fire departments, among their employees, for the purpose of preventing fire, or at least of miniminizing loss in case fire does occur. Nearly every road in the country has recognized practically the pecuniary advantage in having a body of trained employees. They have expended money in the maintenance of an instruction car in which air brake operation is taught, and in which the principles of steam heating, signalling, and possibly electric lighting may also be taught. The advantages gained in all these ways, do not show as definite items worth so many dollars each upon the pages of the accountant's ledger, yet no one doubts that they are revenue producers. Many roads have adopted the Brown system of discipline without punishment, and others have gone so far as to introduce the pension system for employees grown old in faithful service.

It may well be asked why has all this been done? The answer is not far to seek, it is common sense, it is humane, and it pays. In glancing at these enlightened methods in railway management, even the casual observer must be struck by the fact that each has its monetary equivalent hidden away somewhere in the half-yearly dividend which the company pays. Efficient, intelligent service, combined with that loyal feeling of *esprit de corps*, which good management creates, is comfortable for the employee, and is a noiseless, constant and effective money saver and money getter for the company.

There is, however, one branch of instruction which, while it gratifies the humane instinct in man and has also its commercial aspect, yet up to the present has not made much headway in this country. It is instruction in the art of giving First Aid to the Injured. In another column, under the heading of "Medical and Surgical Matters," will be found a brief resumé of an account of the competition, in this art, among the employees of the Cheshire Lines, held recently in Liverpool, England. The winning team, in addition to the prize it carried off, from the fact of taking first place, thereby secured the honor of becoming the representative, in this department, of the Cheshire Lines, in the competition open to all railways, held each year in the Crystal Palace in London.

The ability to give the requisite scientific "first aid," will be found upon examination to have a two-fold value. It is valuable in the first place in the highest sense in which that term can be employed, because it is humane, and its exercise brings out all that is best and noblest in man's nature. It is valuable in the second place, because it helps to promote efficient railway service, and because, like the other forms of instruction, it is capable of indirectly saving money for the company adopting it.

There can be no question as to its humanity. One has only to see, or even hear of, such an accident as the breaking of, let us say, the thigh bone of an employee, to readily grasp the importance of efficient First Aid. The fracture may be just one clean break—what is technically known as a simple fracture. Well-meaning, kind-hearted, but ignorant and unskillful handling may cause the broken ends of the bone to tear up through the flesh, and protrude through a ghastly and bleeding wound, entailing much graver consequences. First Aid would have taught those around to have lifted the sufferer carefully and only after a board had been passed gently under the broken limb. In such an accident inevitable suffering may be transformed into acute agony, with every feeling of helpless pity aroused and with every desire to render help. It is but scanty satisfaction to those about to hear an injured man beg pitiously of fellow workmen and friends to let him suffer as he is, rather than face the tortures incident to their well intentioned, but woefully misdirected ministrations. Each of the bewildered squad of men, who have made bad worse, in the endeavor to alleviate pain, can only take to themselves the negative consolation of the thought: "It is poor Billy Bishop's hard fate to-day, it may be mine to-morrow."

First Aid to the Injured, promptly rendered by men properly instructed—therefore judicious and resourceful, albeit without technical information—of what priceless value may it not be? The simple but often most supremely important

procedure to be taken in dealing with "shock" to the system, in a case which is not necessarily otherwise serious; the tourniquet applied promptly and in the right place may stop the flow of blood and save a life, without the operators knowing aught of anatomy but the position of the artery. Knowledge which will withhold, at the right time, a stimulant which would only excite the heart's action to greater activity in pumping out the life's blood, through a gaping wound, etc., such knowledge is priceless in emergency, but within the reach of only the instructed. The skillful application of an Esmarch bandage may save much suffering and earn a "well done," from the railway surgeon when he comes to handle the case. All this and more, may be had by systematic instruction of even the most elementary kind. No need to teach men the definition of a compound or comminuted fracture; no need to explain the pathology of traumatic fever, or the chemical composition of an antiseptic. The end sought may be gained by simpler and more effective means, and every act of instructed help will be a mercy to the sufferers and a joy to the humane and sympathetic man.

The ability to render First Aid, promptly and efficiently, must have a beneficial effect upon the service in general. It will tend to make men gentle, cool, fearless, prompt, adequate in emergency; and these qualities once gained, will react beneficially in every operation of railway work, even if the emergency is only one arising in the routine of ordinary business, where property only is endangered. The ability to think calmly and act promptly, if possessed even in small measure by employees, will be a direct gain to the company whose men have been so taught.

Lastly, there is the inevitable commercial aspect to the question. Dr. F. B. Powers, in his thoughtful paper read before the Association of Railway Surgeons (a resumé of which appeared in the Digest of February), has pointed out that if the requisite knowledge was possessed by railway employees, and if the traveling public was aware of the fact that the men on the road had been so instructed, it would produce a feeling of security in the minds of the patrons of the road. The public, it is certain, would never make use of such information to stay away from the road whose employees were known to have been formed into a sort of informal, but instructed and competant ambulance corps, and that fact would most certainly have a definite bearing upon passenger receipts in these days of keen competition. In case of accident "first aid" might have the effect of reducing the element of comparative seriousness of character of an injury, and later on of keeping down the urgency or the amount of claims made, and the fact that every employee practically carried beneath the blue sleeve of his workman's smock, the Red Cross badge, and had acted in emergency where life or limb was in jeopardy, as science and as enlightened humanity would direct, that fact would certainly not be thrown away on the "twelve good men and true," who might subsequently hear of the skillful performance of duty, in the alleviation of human, or even of animal suffering.

To equip and maintain an effective ambulance corps throughout the personnel of the road, might in times of "stress and strain," not only be most merciful and humane, but might mean hard cash in the treasury of the company which had called it into being.

Mr. Geo. H. Daniels, speaking recently at a meeting of the Get-Together Club, said that on the New York Central a system of hospitals is being developed for the care of the sick and injured; emergency boxes, containing articles necessary for use in case of accident or injury, are placed in cars, shops and round-houses, the men receiving instructions in First Aid to the Injured.

The Delaware, Lackawanna & Western Railroad also gives instruction in First Aid, and has emergency boxes distributed at various points on the system. At least thirty employees at Hoboken alone have received instruction and have passed an examination in this important branch of knowledge. It would be interesting and perhaps instructive if an informal competition could be held between the N. Y. C. and the Lackawanna Red Cross men, similar to that which recently took place on the Cheshire Lines, in England.

IMPROVED METHODS OF ROAD BALLASTING

On March 12, and for several days following, the Goodwin Car Company made a test of its patent dump cars, on the Erie Railroad, a few miles out from Jersey City. Two cars were filled with ashes and dumped along the track as directed by the officials of the Erie Road, who were present. The operations constituted what Mr. Jim Skeevers would have called an "Object lesson" on ballasting.

The Goodwin car, when with parts in normal position and when carrying a load, has in section, the form of the letter X. The upper V shaped or hopper portion contains the load, while lower arms of the X form deflectors or chutes, which, when appropriately arranged, determine where the load shall be deposited. If a loaded Goodwin car stands perfectly still upon the track, it is, by reason of its construction, capable of a number of combinations. That is (1) the load can be dropped wholly between the rails; (2) it can be discharged entirely to the right, outside the track, or entirely to the left, outside the track; (3) it can be distributed equally on both sides, outside the track; (4) it can be laid along the inside and outside the same rail, or (5) it can be laid exclusively along the inside of one rail (either rail may be the choice of the operator); (6) it can be spread along the outside of one rail and between both rails; (7) it may be placed outside both rails and close to the inside of one rail, or (8) it may be spread along the outside and inside of both rails. With car still at rest, the load can be dropped *en masse*, or poured slowly from the car at the pleasure of the operator. Now it is manifest that the two speeds of discharge, which the car itself possesses, are capable of all shades of modification according as the movement of the car is fast or slow. This constitutes a very important point in connection with ballasting operations. The amount of ballast spread over a given distance, i. e., the thickness of the ballast laid down, can be regulated primarily by the size of opening through which the ballast falls out, and further controlled by the speed of the train.

To follow more readily the combinations of which the car is capable, reference is directed to Fig. 1, in which the X section is roughly apparent. The valves A and B, which form the upper arms of the letter X, and which form the floor upon which the load rests, are movable, being hinged at their upper ends, as shown. The two triangles, E, F, are

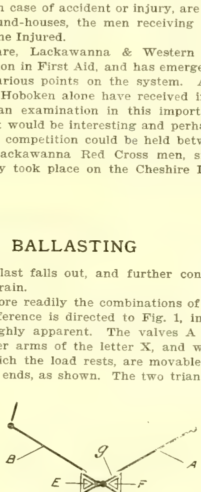


Fig. 1

capable of motion about the points indicated. The two portions of the lower chute C and D are also movable about points indicated by the bulb ends shown in the figure. Figs. 2 to 7, inclusive, show the combinations of valves, triangles, detents and movable portions of chutes which produce the various results desired. Valves A and B fall open by their own weight, whenever the triangles E and F are revolved about their centres of motion, which correspond closely to the intersection of arms of the X. By dropping triangle F, its upper face, G, comes in line with C, the chute members of the car. Plates C and D must always be placed, as desired, by hand, before the operation of dumping is performed; one man being able to place them as desired. For slow dump-

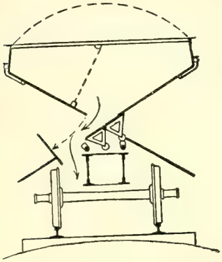


Fig. 2

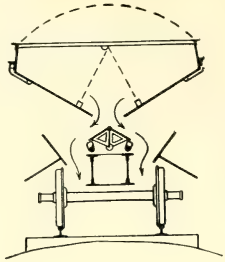


Fig. 3

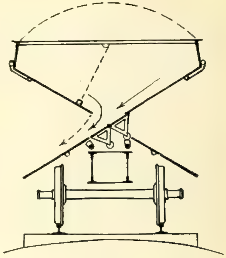


Fig. 4

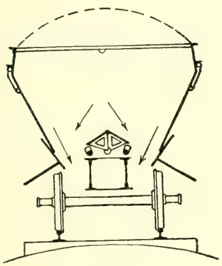


Fig. 5

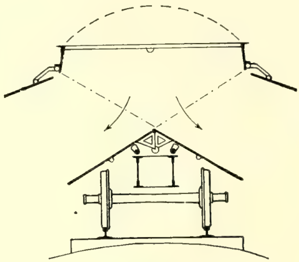


Fig. 6

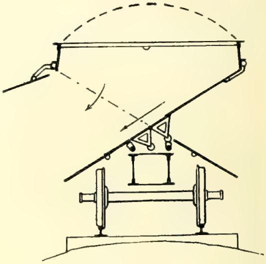


Fig. 7

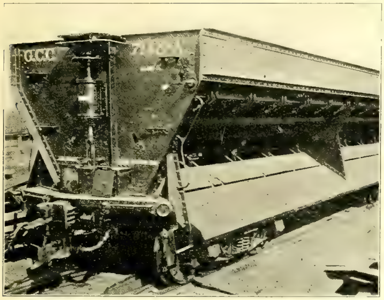
ing it is only necessary to shoot two bolts, by hand, which placed at either end, will hold the valves A and B in their normal position and only give egress to the load through the somewhat restricted opening afforded by revolving one of the triangles E or F, as shown in Figs. 2, 3 and 4, the outside or inside flow of ballast being determined by the position of the chute plates C or D. The valves are drawn up again in place, and the triangles also replaced by the use of a chain and rachet lever and a hook which automatically lets go when the valves are up. The Goodwin car may be operated by hand or by air appliances, and it is interesting to glance at the mechanism by which the various combinations can be effected. At first sight one might be puzzled to see "how the air knows" which side or which car is to be dumped, as any or all of the cars in a train may be dumped at a given moment, and all the changes can be rung upon the combinations of outside, centre, fast or slow dumping. Each car is made entirely of structural steel, and is divided into two compartments by a bulkhead in the centre, and the movable members in each compartment are operated by a New York air brake cylinder placed at each end, as shown in the half tone illustrations.

When air is admitted to any one of the air cylinders, the piston moves up. The lower end of the piston rod is attached to a long fork, which is seen in the uppermost half tone, as drawn half-way up out of a box which rests on the top of the end sill. The forked ends are attached to two levers, which are always drawn up, when the piston is moved up. These levers do not operate any mechanism unless connected with the levers attached to the dumping mechanism. Two levers lying close alongside of these idle levers operate the detents. When it is desired to connect the air mechanism with the detent levers, a pin is passed through holes in both idle and detent levers, which are side by side, and thus combined air pressure and detent mechanism operate together to the same end. It is, therefore, the insertion or withdrawal of a pin, on either side and at either end, that determines which detent will revolve, which triangle will fail and which valve will "let go." The apparent mystery of the almost intelligent selective action of the air cylinder is at once clear.

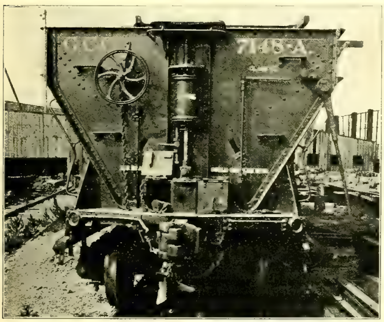
Air to operate the dumping mechanism is drawn from the train line, through a pipe having a gravity closing check valve, which prevents air which has once passed it, on its way to the Goodwin storage reservoir, from returning. The actual opening from train line to storage reservoir is through a gate valve having a hole in it 1-32 of an inch in diameter. There is another valve which, when closed, effectually cuts off the supply of air from the Goodwin mechanism. The air supply for operation of these cars is no heavier drain on the air brake system, than a small leak, against which, "from long practice," any good air pump can very successfully contend.

In the absence of air pressure a car can be dumped by raising the piston by hand. At the centre of the wheel, shown in the illustrations, above the air cylinder is a nut, and by revolving this wheel the nut runs up the hollow threaded shaft. The extension piston rod being inside, this shaft is attached by a key to the loose collar which rests upon the nut, the hollow threaded shaft being cut in two by a slot for the upward or downward movement of the key, it follows that when the hand-wheel is revolved, the collar rises and draws the extension piston-rod up, producing the same effect on the dumping mechanism as that produced by the air.

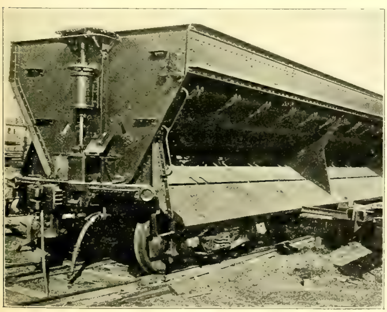
Goodwin cars, which are leased only, are especially adapted to the coal or ore trade, as well as being available



for ballasting. They will discharge tin plate bars, grain in bags, loose grain, broken stone, large rock, steel billets, coal, coke, ore, pig-iron, parts of machinery, rail ends, castings, gravel and cinders, cold or hot. This latter feature, that of holding a hot load without detriment to the car has been provided for by lapping of the plates of the hopper, which are



therefore free to expand without injury to the car. It would be quite possible for a railroad, provided with a suitable ash pit, to place a Goodwin steel car below, and dump ashes direct from the ash pan of a locomotive into the car. A stream of water directed into the car would complete the cooling of the cinders, and the whole load would be ready, as soon as the car was full, to dump in yard or on road, without any intermediate handling or shovelling. The extended uses to which these cars may be put and the really simple operation of which they permit, together with the reduction of working force and the saving of time, are valuable features which appeal to the modern railroad man. A train of Goodwin cars, loaded with ballast, can proceed out on the main line and dump at any point, or at several, along the line, and, without stopping, proceed to the next station ahead, with no more loss of time or bother to a train despatcher, than a regular freight train gives him in going from one station to another. Ashes or ballast can be spread along an enbankment for a distance of several hundred feet, and can be thrown 16 to 18 feet from the rail, clear of the track. The time required to unload two cars is 15 seconds, with one operator, the rails being in all cases absolutely clean and clear from the material.



The Southern Pacific Tonnage Rating

Editors, Railroad Digest:

In your valuable journal for March I note an extract from my paper on "Tonnage Rating," read before the Pacific Coast Railway Club last November, and I note with satisfaction that you have grasped the essence of our tonnage rating system, viz.: *the maximum load that can be hauled with the utmost economy, all things considered, within the schedule time.*

Pardon the correction, but you have slightly misquoted me wherein you say we have found the assumed time allowance of one-half minute per mile for stops on through freight trains was sufficient.* Actual practice shows that this is an extremely variable quantity, running from 25 to 30 seconds per mile run on valley lines, to 2 minutes and 30 seconds per mile run on heavy ascending grade lines, varying according to the physical characteristics, length of sidings to hold long trains, facilities for taking coal and water and volume of tonnage handled; hence, in making engine ratings, it is highly essential that the time needed for stops should be first determined on each run, and a load plotted that will consume the remainder of the card time allowed between terminals.

The advantages to be derived from this system are:

1. We calculate the energy to be gained from momentum which carries us over many otherwise limiting points where the grade is not too long, the daily practice checking closely with the theoretical calculations.

2. All *through ratings* are based on *time* and *load; local ratings* only being based on capacity of power. All other tonnage rating systems of which we are cognizant, are based on capacity of power, and through ratings are made by taking an arbitrary proportion of the *capacity-load.*

3. Figuratively speaking, every piece of track in each direction is gone over in the Engineering Department, and the resistance offered (based on resistance formula used), is determined, and the energy to be gained from momentum is calculated, to arrive at the load that can be taken with each unit of tractive power (1,000 lbs.) at *varying speeds.*

4. In addition to the rating for each engine, the rating sheets show, for information of dispatchers, the percentage of load greater than rating that can be taken as a maximum between every two stations each way.

[*"Daily efficiency reports are sent to our office from each division of the Pacific system, and the results are most gratifying on every division where the assumed time allowance for stops of one-half minute per mile on through freight, which I understand was originally agreed to by the various superintendents, happens to be enough to cover the time actually required for station, water and meeting stops." The above is the way in which the time allowance is stated on page 206 of the Pacific Coast Club Proceedings. We said: "This time limit between points has in it all the way through, an allowance for stops, it is one-half minute per mile on through freights, and this has been found sufficient to cover the time actually required for station, water and meeting stops." Any misquotation found here was unintentional.—Eds. Railroad Digest.]

5. On our long through lines, *time* is an important factor, and in addition to the relative efficiency attained for each train, our daily reports from superintendents show the actual time consumed, excluding stops, as well as total time consumed, enabling us to promptly locate apparently unnecessary delays.

6. At the end of each month a detailed report is made, copy of which is sent to each division, so each superintendent can see what all others are doing. This report shows for last two months compared:

a. Freight run.

b. Speed in miles per hour, excluding stops.

c. Average actual running time of trains in hours and minutes, excluding stops.

d. Average total time in hours and minutes, including stops.

e. Average time consumed in stops in hours and minutes.

f. Average time used in stops per mile run in minutes and seconds.

g. Average daily percentage of efficiency of actual load to tonnage rating, the rating being taken as 100 per cent.

This naturally prompts those making a poor showing to make a strenuous effort to keep from being in the rear of the procession.

As an illustration of the uniformity of this system of tonnage rating, the reports for February (the latest reports to date) show a variation of only four points, from 81 per cent. to 85 per cent. efficiency (the rating in each case being taken as 100 per cent.), on the seven divisions, embracing both hill and valley sections varying from a level track to 2.2 per cent. on the Sacramento and Tehachapi grades and to 3.5 per cent. on the Siskiyou Mountains.

The new *time-load* system of tonnage rating was put into effect on this company's lines July 1, 1900. Prior thereto, the load was based on capacity of power, reduced arbitrarily to meet time requirements. The last half of 1899 under the old system, the performance was the best in the history of the company, up to that date. Comparing the last six months of 1900, under the new system, with the last half of 1899, under the old system, and we have: *Ton-miles of revenue freight handled.* Last half of 1899, 1,479,405,257; last half of 1900, 1,644,621,974, an increase in volume of 11.2 per cent.

The total mileage of freight locomotives, including those double-heading, or helping trains, or run light in connection with them, was as follows: Last half of 1899, 6,487,956; last half of 1900, 6,588,420, an increase of only 1.5 per cent. in engine miles to move 11.2 per cent. more ton-miles and with an increase of only 2.8 per cent. in cost of locomtive service and trainmen. The tons of freight per engine mile increased from 228 to 250 tons, the saving by heavier loading being equivalent to the movement of 624,834 engine miles in the period in question, or at the rate of 1,250,000 engine miles per annum.

Nothwithstanding this encouraging performance, the results thus far this year are even better than last and there is a gradual improvement all around as the men become familiar with the system. B. A. WORTHINGTON,

In charge of Tonnage Rating, Southern Pacific Company.

A Private Car Company's Hardships

Editors Railroad Digest:

Referring to your February, 1901, issue, subject: "The Iniquitous 'Line Car,' " I would like to correct a mistaken idea that seems to prevail among some men, that all private lines are 'iniquitous' and are an expense to railroads in making repairs to their cars, as asserted by Railway and Locomotive Engineering, January, 1901.

In the first place, you will find different railroad employees charging each other with being dishonest. Now, in view of this fact, are these men honest with the private line cars? If a railroad is not treated fairly in its dealings with another road, it can retaliate by doing likewise; but the private line cannot retaliate, if imposed upon, for its does no damage to, nor does it repair cars belonging to any of the lines over which its cars may be moved.

Nine times out of ten, if a railroad removes nearly new wheels and axles on account of flat spots caused by sliding, or any defect not chargeable to owners, it will pick out wheels and axles nearly worn out to replace the new ones removed; and, until last year, it would charge for the brasses exchanged. I know of a private line car making a round trip on only two different roads, returning home with an axle 1¾ inches too long and with second-hand wheels applied. Both these roads claimed they never applied the wheels or axle. The private line could not get any relief, nor could it use this axle, while a railroad could certainly find occasion for repairs to cars that had axles 1¾ inches longer than those named in M. C. B. Rules. Cases similar to the above occur quite frequently, but are only caught up once in a while.

As regards brasses, the private lines pay for more than they should. For authority as to this assertion I would respectfully refer them to the M. C. B. Proceedings of 1896, pages 326 and 327, wherein Mr. Barr said, "47 per cent. of hot boxes were found on foreign cars," and stated that this was against his wishes.

A railroad may break two sills in a wreck, replace them and charge the owners; whereas it is no fault of the owners, but due solely to the neglect of the road's employees in not obeying orders, etc. In this case, as in all others, railroads can "do unto others as the others do unto them," but the private car lines cannot. They can participate in all losses, but not in any of the gains under the M. C. B. Rules.

PRIVATE LINE FOREMAN.

Adjustment of Labor Grievances

In the March Review of Reviews Professor John R. Commons describes the remarkable arrangement between the employers and employees of certain trades in this country by which differences are adjusted in delegate bodies representing both sides. These conferences are now held regularly by the 'longshoremen and the dock managers of the Great Lakes, by the bituminous coal miners and operators, by the National Stove Founders and the Iron Molders' Union, and by some other important trades. What gives especial timeliness to Professor Commons' article is the proposal to extend the system to the anthracite coal industry of Pennsylvania, which has been considered in a conference of miners and operators during the month of March.

A "Mastodon" Type

Cuvier was the first naturalist to make a study of the prehistoric beasts, birds and reptiles which once inhabited the globe, and to attempt restorations of their complete selves from stray bones and fossil footprints. Most unpleasant and terrific animals many of them turned out to be; and the idea occurred to a jocular student of the university that it would be good fun to appear at Cuvier's bedside at midnight in the character of the outraged and vengeful ghost of one of them, displeased at the efforts of a puny man to reconstruct its remains. So said, so done. The clever youth arrayed himself in a frightful costume, with scales and tails and glaring eyes and horns and hoofs, and secretly effecting an entrance into the naturalist's house, stole softly to his chamber. He was sleeping peacefully. The intruder wakened him by setting two hideous forehoofs upon the counterpane; then, as he stirred, blinked and started up, it remarked in hoarse and ghostly tones: "Cuvier! Cuvier! I've come to eat you!" But not even when half asleep could Cuvier be mistaken in the distinguishing charactertistics of a carnivorous animal. He looked at the monstrous thing again. "Humph!" he muttered, with sleepy contempt. "Horns—hoofs—graminivorous. You can't!" The extinct monster retired, more extinct than ever, and the scientist returned triumphantly to his slumbers.—Toronto Saturday Night.

It has been figured out that within the next eight years the pension plan on the Pennsylvania system will cause the retirement of more than 2,250 employees. When the plan on the lines of the system west of Pittsburg became effective recently, 250 veterans in the service of the road were retired.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Object Lesson in Road Building

Railroad Gazette, March 15, 1901, p. 189.

The Illinois Central Railroad is doing some special work in educating the people along its lines as to the possibilities and value of better roads. A train is to be sent north from New Orleans to Chicago to give object lessons in road-building. At a number of places the train will stop and pieces of model road will be built. Arrangements will also be made for public meetings for discussing the matter of better roads. This is an enlightened procedure and is almost certain to ultimately return to the railroad company a good interest on the money and energy invested.

Standard Meaning for Words, Yards and Terminals

Railway and Engineering Review, March 16, 1901, p. 151.

According to the committee report presented to the American Railway Engineering and Maintenance-of-Way Association few railroads are in a position to discuss questions arising in connection with terminal work, free from the limitations imposed by the existence of facilities already established. Many errors in design, however, may be avoided by the elucidation of the principles appertaining to terminal service. The aim of the committee was not to lay down standards which must not be departed from, but to present principles and typical methods of practice which are generally applicable. Knowing the confusion and trouble which so often arise out of the indiscriminate use, or misuse, or misapprehension of terms, the committee set about to adopt a series of standard terms, and formulated definitions of these terms, which they hope to see universally used. For instance, the word "yard" was used to designate many things, which had perhaps no relation to one another, or there might be some relations between them. Ordinarily this caused some confusion, but when questions involving yard design and operation came to be technically considered, the greatest confusion was manifest. So the committee acted radically and decided to call the entire series of yards a "Cluster." A yard was decided to be used in designating one set of tracks for the switching or storage of cars. In like manner the word "Terminal" was taken to designate all the facilities provided for terminal work on a large or small scale.

Masonry

Railway Age, March 15, 1901, p. 275.

Report of Committee on Masonry to the Maintenance-of-Way Association.

Hereafter, according to the American Railway Engineering and Maintenance-of-Way Committee report, the term "masonry" should include brick and concrete, as well as stone work. Stone for railroad work has generally been the most common, the cheapest and the most available material. The first requisite is cheapness; the second, durability, of which composition, texture, hardness, strength and structure are attributes. Appearance is but of minor importance. Stone suffers severely from mechanical and chemical action, particularly when at the water line. Good stone for masonry should have a homogeneous and compact texture, a grain not too coarse and constituents not readily soluble. Brick masonry is but sparingly used. In all classes of masonry, particularly in concrete, the quality of the sand is of paramount importance. All sand should be silicia, as it insures permanence to the masonry. Concrete is becoming more appreciated every year. It always fills the gap, where stone is found to be impracticable. On all important structures which are exposed to the elements, Portland cement is to be preferred; natural cement should be confined to all interior work. Concrete can be transported cheaper than the mass of other classes of masonry; it can be economically handled, and there is no waste material unsuitable for use at other points. It is, perhaps, the cheapest and most satisfactory method of repairing old structures, and for increasing the strength of arches.

Graduation

Railway and Engineering Review, March 16, 1901, p. 190.

The committee report to the American Railway Engineering and Maintenance-of-Way Association, after defining the term graduation, says that it is the fundamental element in construction, and on it depends to a large extent the future cost of maintenance. Too much attention is given to the shape of the roadbed at sub-grade. Simple drainage planes of a uniform slope of .04 per foot are found to be effective. The width of roadbeds should be 20 ft. on embankments, and a corresponding width between ditches in cuts should be taken as minimum for single track, with an addition of 13 to 14 ft. in case of double track.

For substantial embankments four requirements are essential: First, proper clearing of the ground to receive the earthwork; secondly, the nature of the ground must be suited for supporting the fill which is to overlie it; thirdly, excavated material must be placed in suitable locations with regard to greatest frictional resistance in masses; fourthly, trimming adapted to the slope. Allowance for shrinkage of embankments of three to seven per cent., according to material, should originally be made. The chief principle in maintenance, however, is to keep the roadbed dry, and to this end all means should be directed, even sub-drainage if necessary. Sodding is the best method of protecting slopes, and this extra expense will be repaid in a few years, since it gives security against heavy maintenance charges. Many banks have been protected by placing blind drains in the slopes at right angles to the line of track, consisting of loose rock put in ditches about 3 ft. wide and 4 ft. deep.

Retaining walls are used to protect the sides of cuts and fills against continual slidings, by building up and lessening the slope; they are also used to prevent abrasion of the embankment by water; and to curtail the spread of the slope of embankments on steep side hills or where land value is a vital matter of expense.

Improvement of grades and alignment may be classed under two heads: First, a lessening of the grades and modification of curvature; secondly, a complete change of location. In either case, the haulage feature of each should be well worked out in connection with probable cost in order

to ascertain the relative future value of each to capital expended.

The value of momentum in surmounting grades must not be lost sight of, as cases of increased load as high as 15 per cent. have frequently been met with when advantage was taken of the momentum. The tonnage each way of the operating district should be figured out, as it may be practicable in some cases to adopt a heavier controlling grade in one direction than the other.

True Economy of Maintenance

Railway Age, March 15, 1901, p. 197.

At the annual meeting of the American Railway Engineering and Maintenance-of-Way Association held last month at Chicago, President J. F. Wallace made an address in which he touched upon the true economy of maintenance. Hand-to-mouth methods, he said, are falling into disuse and more consideration, on the part of railway managers, is being given to maintenance problems. When regularity in maintenance expenses can be had, the more economical results can be obtained. As the railroad situation in America is rapidly reaching a position of permanency, the sum required for future maintenance expenses should become a matter of estimate. When the officer who has charge of the physical condition of the road can lay before his general manager carefully prepared and accurate budgets of expenses for the year, as well as estimates of normal amounts on different items, haphazard managing methods will disappear and the work will be intelligently done to the satisfaction of all concerned. When there are items which cannot well be provided for with regular annual appropriations for renewals, the average sums necessary can be approximately determined and certain sums set aside for these extraordinary renewals. When the work is carried forward on such a basis, comparative statements will be of more value, and the fluctuations above or below normal, will be due to causes which can be determined and explained. A question which should be determined is the approximate normal amounts for the proper maintenance of railroad properties. This can be ascertained by the collection of facts from the experience of different roads and the sums expended by them on the different items of maintenance.

Above all, consideration should be given to the proper relations between physical betterments and the purposes they are intended to serve. Engineers should not fall into the error of looking at their work from a technical standpoint only and endeavoring to rear the most perfect monuments to their skill; building structures at which they can point to with pride, as samples of their work, while forgetting the fact that the ultimate aim of railroad construction and maintenance is to provide for the safe, expeditious and economical handling of traffic, to which end all other considerations should be made subordinate.

Track

Railway and Engineering Review, March 16, 1901, p. 168.

The committee having the matter in hand reported to Maintenance-of-Way Association that poor alignment of track can be greatly improved by the introduction of casement, or spiral curves, and by their judicious use, these improvements can be made without varying from the old alignment sufficiently to have the track itself on a new roadbed. As regards curve elevation, it may be said that it is finally settled by experiment, whatever the rule may rest upon in theoretical calculation. The matter is usually left to the judgment of the engineer in charge of each division. The general rule for mixed traffic on level track is to elevate the outer rail 1 in. per degree of curvature, to a maximum of 6 ins. of super-elevation. The preference for maximum elevation is 6 ins. The most general idea in vogue for elevating curves is to estimate the elevation first applied, according to knowledge of speed and traffic, and then observe how the cars ride and, if necessary, adjust the elevation until the cars ride satisfactorily. Heavy, slow-speed freight trains on curves elevated for fast passenger traffic have very ill effects. The inner rail becomes excessively worn and canted, and the ties are abnormally cut. Also, on account of the disproportion of weight bearing upon the inner side of the curve the track tends to constantly increase its elevation; consequently, the track is displaced in line and the tie-plates are bent.

On account of the lateral pressure due to the tendency of the wheels to run in a straight line, it is impossible at present to prevent flange pressure of wheels against the outer rail of the track; but with proper elevation, the centrifugal force can be counteracted.

Opinions as to the superiority of the curve over the tangent differ, but the weightier arguments appear to be on the side of the tangent, since different elevations for different traffic are required by the curve, while the tangent is level for all. It has been ascertained that speed as high as 60 miles per hour should not be made on curves sharper than 4 degrees.

The inspection of tracks, frogs, switches and crossings is recognized to be of more than passing importance, and trackmen should frequently inspect bridges, trestles and culverts.

Oiled Roadbed on Long Island Railroad

Railroad Gazette, March 1901, p. 155.

Mr. C. L. Addison, general roadmaster of the Long Island Railroad, states in the Gazette that the oiled roadbed, which the Long Island Railroad has been experimenting with for the last three years, is quite successful. Up to 1897 the dust on the line was unbearable and it was decided the following year to use oil as a dust preventative. The best results were obtained where heavy sand or light gravel was treated. Applied to light sand, the oil forms a crust which is easily broken, and so exposes unsaturated material. In heavy sand or light gravel, a crust several inches in depth is formed, which is not easily disturbed. At first over 2,000 gallons per mile was used; now less than 1,500 gallons per mile are required. Mr. Addison claims the oil retards the growth of weeds as well as preventing the track from freezing in the winter with the consequent heaving up in the spring. It also has a preservative effect on the cross ties. At first it emits a slight odor, which is not disagreeable and which passes away in a few days. The cost of oiling one mile of single track is as follows: 1898, \$69, including royalty; 1899, \$50, no royalty; 1900, \$61, no royalty.

Cross Ties

Railway Age, March 15, 1901, p. 341.

The report of the Committee on Ties Made to the American Railway Engineering and Maintenance-of-Way Association, says:

Railroad companies have generally used cross ties made from timbers adjacent to their territory. So the value of the woods used is now well known. In the Eastern, Middle and some of the Western States it is a matter of history that white oak ties are the best obtainable, and last 8 or 9 years. The Canadian roads use cedar and hemlock mostly, the Southern roads use yellow pine and the Western use mountain pine and redwood. The Eastern and Middle States roads find that the price of white oak ties is steadily on the increase, showing a growing scarcity. They will, therefore, make inroads on yellow pine, hemlock, cedar and the other woods, which will reduce the available supply for roads now using these ties. Already some three or four per cent. of the ties annually laid or renewed in this country are being chemically treated for the purpose of preserving them. The methods used are either external applications, or the injection of chemicals under pressure. There are a number of different external applications, which, if the wood be well seasoned and no moisture or germs incased, are quite successful. It has been found that the best chemicals for preserving ties are corrosive sublimate, sulphate of copper, chloride of zinc and creosote. The latter two are now in extensive use. Pressure in closed retorts is the only method of injection now in use by the pioneer American railroads. Creosoting is the standard method of preserving ties in Europe. It is expensive, but it is the best. The cost of

creosoting per tie is from 25 to 65 cents, and the tie will last from 15 to 27 years. Some roads use old ties for fence posts, and others use them to advantage on spurs and unimportant sidings, or for blocking purposes.

Tunnel Ventilation on the Norfolk and Western

Railway and Engineering Review, March 16, 1901, p. 162.

Ventilation appears to be the first necessity from the point of view of maintenance. The Norfolk and Western Railroad has lately come to an appreciation of that fact, and is now installing in its Elkhorn tunnel a system of ventilation to improve the atmosphere inside, which becomes, with its enormously heavy service, so foul that it is difficult to operate trains through it. After very careful investigation, the railway people have adopted what is called the Saccardo system, invented by Saccardo, an Italian engineer, who introduced it first on the Pracchia tunnel with the greatest success, and afterward on other Italian and French tunnels. The ordinary method of ventilation is induction, by suction with a centrifugal fan from a middle point in the tunnel. This method is the reverse of that. It consists in forcing in fresh air. The portal of the tunnel is bell-mouthed, leaving an annular space between the clearance line of the tunnel and the outside of the bell-mouth, and the centrifugal ventilating fan, working under pressure, forces air in, on the principle of the steam injector, such as is used on an engine. There is every evidence that the improvement of ventilation in that tunnel will increase the life of the track.

Ventilation of East Mahanoy Tunnel

Railroad Gazette, March 8, 1901, p. 154.

A description of the method of ventilating the East Mahanoy Tunnel on the Philadelphia & Reading, is here given by Mr. Theodore Voorhees, C. E., first vice-president of the road. The tunnel was built in 1861, and is 3,406 feet long. It lies in an almost exactly northwesterly direction through the mountain. The traffic through it is heavy and destined to increase. Owing to the situation of the north portal at the head of the valley between hills of considerable altitude, the prevalance at times of northwest winds, and the existence of a 0.7 per cent. grade going north in the tunnel, there are times when the air is so foul as to be unsafe for crews of slow moving trains. In order to ventilate this tunnel advantage was taken of the working of the Buck Mountain coal vein, which is cut by the tunnel at a distance of 850 feet from the north portal, the vein dipping north 28 degrees and cropping out on the mountain 214 feet vertically over the tunnel. An airway was cut through this inclined coal seam and a power plant and fan was placed where it opens to the atmosphere on the mountain side. The airway, which is straight over the tunnel and almost in line with it, leaves the tunnel in two headings, which begin at each side in the roof. The object of this is to prevent anything falling down the air shaft and dropping upon the track. The point upon which such a falling piece of material would strike in the air shaft, is filled in solidly with wood. The tunnel has the opening of the air shaft 850 feet from the north portal and 2,256 feet from the south.

An average of five tests showed that with the exhaust fan in operation 251,000 cu. ft. of air were withdrawn from the tunnel per minute, and to replace this amount 138,000 cu. ft. passed in at the north portal and 113,000 cu. ft. entered the south portal. The entire air contents of the tunnel could be withdrawn in five minutes. The tunnel is at present wide enough for two tracks as far as the roof construction has been made, but there is a bench on one side which has yet to come out before a second track can be laid. When this is done Mr. Voorhees thinks that a drop curtain of canvas may be necessary at the north portal to compensate for the difference in length of both ends. The cost of operating the plant is approximately $200 per month. This amounts to a charge of about 75 cents per 1,000 tons of tonnage north and south bound, moved through the tunnel, or three-quarters of a mill per ton. The work was done by the Philadelphia and Reading Coal and Iron Company, and the plant was built after plans prepared by Mr. Geo. S. Clemens, Division Engineer; the fan, which is 21 ft. in diameter, was designed and built by Mr. John Wood, superintendent of the Pottsville shops of the Coal & Iron Co.

Grade Crossings

Railway World, March 23, 1901, p. 326.

Mr. Granbach, of Philadelphia, recently introduced in the Pennsylvania Senate, a bill regulating the abolishing of railroad grade crossings. The measure apparently intends to place the question before the Court of Common Pleas. Councilmanic ordinances at present cover most cases regarding the changing of grades. If the new bill becomes law, all crossings hereafter created must be above or below grade, except where the courts decide otherwise. A company cannot make a crossing at grade unless the court so permits. The division of the cost of making crossings above or below grade is one of the main provisions of the new measure. If a railroad is to cross an already recognized highway, the municipalities shall bear only one-third of the expenses; but if a highway is to run across a railroad, the municipality shall bear one-half the cost. These ratios hold for changes in present crossings. So if the proposed raising of grade of the Reading Railroad in Philadelphia from Spring Garden street to Cumberland street were carried out under the provisions of this bill, the city would bear only one-third of the cost, whereas under the present plan, it would pay one-half the cost.

Highway Crossings

Railway and Engineering Review, March 16, 1901, p. 155.

The Maintenance of Way Association committee's report on "Highway Crossings," says: "Although in certain sections where trains are numerous and traffic heavy, there is a tendency to eliminate all surface crossings, nevertheless, there is little prospect of any general and radical change of methods. The law requires that persons near the crossings be warned of the approach of a train by sign, whistle and bell, and then it is incumbent on passersby to avoid the train. The planking of a crossing should be smooth, the drainage good and the grade easy, so as to facilitate the passage of a vehicle in the shortest possible time. Where the whistle and bell cannot be heard nor the approaching train seen, the electric alarm bell has been used with good results, doing away in many cases with the expense of a watchman. The chief objection to automatic bells is the possibility of failure and the increased liability of the railroad in case of an accident. Statistics show that they may be depended on not to fail oftener than once or twice a year. The prevailing opinion is that bells should give at least thirty seconds warning of the approach of a train and be equipped with a twelve-inch gong. Inspection should be frequent. When railway and highway traffic are considerable, and on important streets, watchmen and gates are a necessity. Maintenance then becomes expensive. The watchman's duty is simple but his responsibility is large. He should know the conditions under which he is working, and should be warned of approaching trains by automatic signal wherever the location demands it. A form of gate operated by compressed air appears to be preferred as the most efficient wherever quick handling is necessary, but mechanically-operated gates in suitable locations are still deemed practicable. The necessity of lighting at crossings is generally assented to, and usually determined by the municipal authorities.

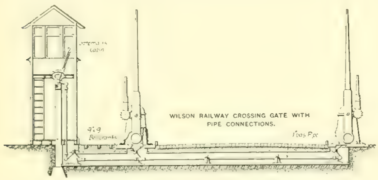
When an electric railway line is crossed, many recognize no obligation on the part of the steam railway to use more care than at an ordinary crossing; some advocate the same precautions as when crossing the tracks of another steam railway. The common method is for the street car conductor to safely flag his car over the crossing, which is, perhaps, presupposing too much. Conditions will dictate the proper safeguards other than the vigilance and judgment of the street car conductor. The tendency of advanced practice is to require derails in the street car tracks located at a proper distance and worked by a lever on the opposite side

of the crossing. The lever should be interlocked with signals on the steam railway track, or, preferably, with a track circuit block, so as to close the crossing to electric cars when the steam railway track is occupied, the levers being worked by the electric car conductor. The crossing accidents in New York State in 1899, amounted to 101 deaths and 79 injuries, along about 8,000 miles of line. It appears that a large proportion of these occurred at city crossings and very few at country crossings remote from stations.

Wilson Crossing Gates

Railway Age, March 22, 1901, p. 375.

Grade crossing gates having arms extending across the road and sidewalks are generally operated by wires or compressed air. The gate illustrated here is operated by pipe connections and levers similar to those of an interlocking plant. In the gateman's tower is placed a lever fitted with sector and latch and connected by 1-inch gas


WILSON RAILWAY CROSSING GATE WITH PIPE CONNECTIONS.

pipe and bell cranks 9x9 in., with the operating mechanism and gate arms. The bell cranks have ⅞-in. turned pins, and the pipe under the roadway is supported by ordinary pipe carriers, as used in interlocking work. The general arrangement is shown in the illustration. This gate was invented some years ago by Mr. H. C. Wilson, who was for 14 years signal engineer on the Grand Trunk Railway of Canada. These gates are now used on a number of leading railways, and are manufactured by the Wilson Gate Company, of Birmingham, Mich. The advantages claimed are reliability, positive action and economy in maintenance.

Water Service

Railway Age, March 15, 1901, p. 324.

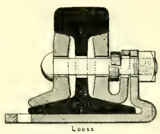
The American Railway Engineering and Maintenance-of-Way Association, at its recent meeting, received a report on water service. It says: The sources of boiler water are two: surface and subterranean. The quantity and quality are hard to determine in the latter, from which water is generally taken by means of deep or shallow wells. The shallow well draws its supply from the immediate surface, whereas the deep well draws from some water-bearing strata. When rains are regular and ample, shallow wells are the rule, on account of their cheapness; but in arid regions the deep well is a necessity. The drilling of such a well is expensive, and many of them are failures either on account of yielding no water or because the water when obtained is unfit for use. All results of trial wells should be carefully kept for estimating purposes. This will save considerable time and expense. In shallow wells a much cheaper form of casing may be used than in deep wells. It may be double or single, black or galvanized iron, according to circumstances. When double casing is used black iron seems best, as it rusts and makes a watertight casing; with galvanized iron it is impossible for a long time to keep out the upper water. In artificial ponds water having practically no impurities, has been found to be almost worthless for locomotive use, on account of foaming. In arid regions, the stored water is apt to be bad on account of the salts picked up during time of flood. Evaporation increases the difficulty and as the supply gets low the water is absolutely unfit for use. In deep wells the water in like strata is usually of like quality, but generally the deeper the stratum the poorer the quality.

When there are a number of wells at a considerable distance from the pump-house, compressed air can be used to force the water to a common tank. It is especially valuable where the water carries quicksand, which destroys ordinary pumps but does not interfere in any way with the compressed air pump.

The Ward Rail Joint

Railroad Gazette, March 15, 1901, page 186.

Mr. D. O. Ward, General Manager of the American Washer & Mfg. Co., of Chicago and Newark, has invented a new rail joint, which he says is necessary to economically provide surface and alignment of rails at the joints. It is shown in the accompanying engraving, and is described as follows: Those who believe in a base-supported joint will readily understand that this type of joint should be provided with a cushion on its outside, and this cushion should be a practical element that will absorb shocks due to lateral thrusts radiating from the wheel flange, as it is well known that a loose base-plate joint is a bad rattler and will soon pound itself to death. If a base type of joint can be kept absolutely tight, no considerable blow will be delivered to the bolts and other members of the joint. It is, however, conceded to be impossible to assemble several metal parts and subject them to the impact and vibrations of passing wheels, and to the equally powerful effects of contraction and expansion, and long maintain a tight joint. We have therefore introduced a new feature, a principle not heretofore employed in a practical form, to overcome the difficulties encountered in a base supported loose joint. This is a compensating force in the upright extensions which are so shaped as to develop powerful resilience when a wrench is



applied to the nuts. At the same time these upright legs act in connection with the angle-bar-forms as supporting girders to resist direct stress from above. These spring arms, as they may be called, will effectually take up all wear, or, more properly, act to preserve all bearings and prevent wear. A portion of the rail flange, it will be observed, is clamped by the curve in the shoe or base plate to prevent impact of the rail base against the base plate when the rail rises and falls, especially when a tie is low. In the opening in the "U" bar a filler of wood may be used. The shrinkage of this wood in dry weather is of no consequence, as it performs no function whatever, acting merely as a filler. Powerful spring washers set in the "U" bar, where each bolt passes through, are preferable to wood, as they are not affected by the weather, and are not subjected to forced strain, as a fatiguing pressure cannot reach them through the walls of the "U" bar, and we have in the washers very efficient auxiliary spring force. Only two rolling fits are attempted in the Ward device, the base support being a gravityfit, and all difficulties pertaining to the rolling of this joint have been overcome and the company is now offering the joint to the trade.

The Smyth Derailing Switch

Railway Age, March 15, 1901, p. 199.

A piece of work is best accomplished when the result is obtained with the least effort and minimum relative expense. The manufacturers of the Smyth derailing switch say their device is not like the average patent medicine, good for everything, but, on the other hand, is good in its place, and is the best derailing switch on the market for the great many instances where conditions neither require nor justify an automatic, nor a split point derailing switch.

Locomotive Equipment, Appliances, and Related Matters

Locomotive Traction Increasers

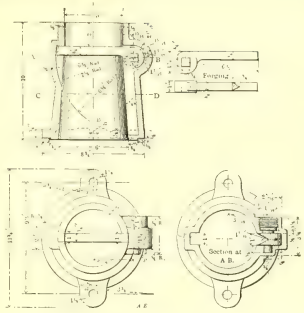
American Engineer and Railroad Journal, March, 1901, p. 82.

In this editorial the Engineer says that about fifteen years ago a form of traction increaser, which temporarily transferred weight from the tender to the driving wheels, was quite common. They were generally applied to engines, which through defective design, were "over-cylindered." Interest in this subject is again awakened by the "Central-Atlantic" type built for the N. Y. C. & H. R. by the Schenectady Locomotive Works. (Illustrated by the Engineer in February and referred to in the Digest for March, pp. 89 and 96.) The traction increaser is to be used at slow speeds only and is not believed to endanger the springs; neither is it likely to squeeze out the oil from the driving journals, because these are made 9½x12 ins., presumably to guard against the effect of this additional temporary load, which is about 12,000 lbs. The device is used to avoid the use of six-coupled wheels and to make the "Atlantic" type do the work of either the ten-wheeler or the other types using six coupled wheels. The traction increaser may have an important influence on passenger locomotive design, for, if successful in extending the use of the four-coupled engine, its use will become general, and if not successful, it will lead to the conclusion that six-coupled engines are necessary for heavy and fast passenger service. By this the Engineer means fast trains of from 13 to 16 cars. The opportunity for comparing the two ideas is at hand in the case of the "Central-Atlantic" type of the N. Y. C. and the new six-coupled passenger engines of the Lake Shore and Michigan Southern, both of which are magnificent in their proportions and power. One stands for the "Atlantic" type with high boiler power and temporary facilities for increasing the starting power, while the other represents almost the same boiler power, with large tractive weight available all the time. There is no choice in the total number of wheels, but the complication of the tractive device in the one case, is balanced against an extra pair of driving wheels and side rods, in the other. These two locomotives are believed to be the most important which have appeared in many years. In view of the fact that the N. Y. C. engine is not expected to haul trains of over ten cars, it is wise for roads having to deal with heavier trains, which are constantly increasing in weight, to carefully consider the problem which the traction increaser introduces. It should not be forgotten that the latest Pullman cars weigh 125,000 lbs., and that engines now new will be in service for twenty years.

Variable Exhaust Nozzle

American Engineer and Railroad Journal, March, 1901, p. 97.

To do away with much of the unnecessary work on the front end of locomotives, in the matter of bridging and bushing nozzle tips, Mr. Symons, Superintendent of Motive Power of the Plant System of Railways, has devised a variable exhaust nozzle, the accompanying engraving of which was prepared from drawings received through the courtesy of Mr. Symons. While no specific claims for economy are made for this device, he believes it is quite a factor in the saving of fuel and eliminating boiler repairs, both in the firebox and front end. The nozzle, which is shown in vertical section, is similar to the ordinary single-tip nozzle, with bosses on each side of the nozzle to allow the V-shaped bridge ¾x¾ in., to swing vertically downward. When in the latter position, this bar or bridge fits into a ⅞x1-in. triangular groove in the side of the nozzle made to receive it. The section at A B shows the bosses cored out to admit the bridge, which is pivoted at one end on a 1 1-16-in. pin, long enough to pass through the smoke arch. This bridge is free at the other end to swing up to a horizontal position against a shoulder in the casting, or it may be turned down out of the way. This appliance is rigged with a 10-in. lever, which



fits on the free end of the pin, which passes through the bridge to the outside of the smoke arch. A reach rod connecting to the lever passes through the cab to a position convenient for the engineer. Notches are made on the reach rod so as to lock the bridge in the desired position. Cards taken from a ten-wheel passenger engine built by the Richmond Locomotive Works for the Plant System, over a year ago, and equipped with the nozzle, show a difference of from 60 to 100 indicated horse-power between the open and the closed nozzle.

American Engines for Ireland

Locomotive Magazine (London), March, 1901, p. 41.

The latest additions to the list of American locomotives in the British Isles are two new engines for the Cork, Bandon & South Coast Railway of Ireland, built by the Baldwin Locomotive Works. The details are of the standard American type. The cylinders are outside, 18 in. diam. by 24 in. stroke, with balanced valves. The coupled wheels are 4 ft. 8 in. diameter, and trailing 2 ft. The rigid wheelbase is 10 ft. 5 in. All the springs for the coupled wheels are compensated, the weight on the coupled axles being 41 tons, and on the pony truck 5 tons 2 cwt., making total weight 46 tons 2 cwt. The boiler is 4 ft. diameter by 13 ft. 6 in. long, and contains 170 tubes 1¾ in. diameter. The firebox is 5 ft. 6 in. long by 3 ft. 5 in. wide, giving a heating surface of 85.1 sq. ft., the tubes being 1,099.6 sq. ft.; total, 1,184.7 sq. ft. The water is carried in a large saddle tank of 1,335 gallons capacity, on top of which are placed two sandboxes. These are, we believe, the first American engines built for Ireland.

Full Throttle and Valve Setting

Railway and Locomotive Engineering, March, 1901, p. 117.

There is a very decided belief among practical locomotive men that the practice of running with a full open throttle is responsible for much of the flattening of driving wheels in spots. Locomotive Engineering says that the matter was fully discussed in its columns several years ago by remarkably intelligent engineers and well-informed men generally; the discussion was not one-sided, but the majority associated wheel flattening with full open throttle. Mr. Howard Curry, of the Northern Pacific Railroad, in a discussion at the Northwest Railway Club, on "Wear of Tires," held that wide open throttle was responsible for the flattening of tires. Mr. Curry at first thought that valve setting might be responsible for it, but after careful observation he abandoned the idea.

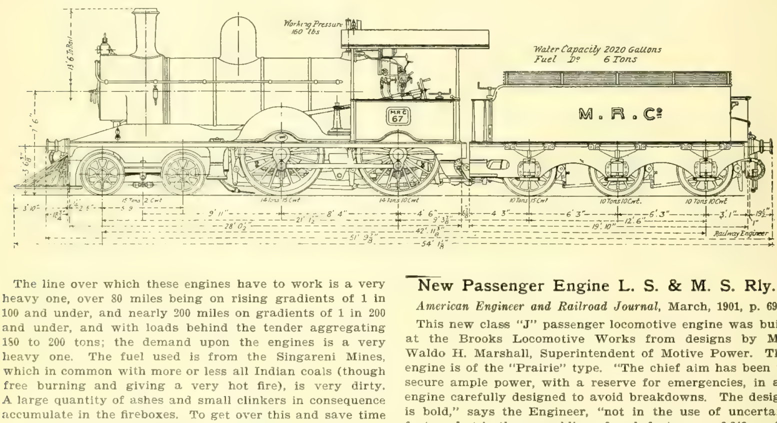
Locomotive Engineering goes on to say: "The valve setters who hold to the tradition that considerable lead opening in full gear will make an engine 'smart' under all conditions of working, are falling monthly into a diminishing minority. If any engine has very long eccentric rods it is all right to give it lead in full gear, but if the rods are abnormally short—a very common condition nowadays—set-

ting the valve blind in full gear will prevent the engine from working against itself when hooked up short. Valves ought to be set to cut off as nearly even as possible at the point where the engine does most of its work. Passenger engines set to cut off evenly at one-third of the stroke will not be much out in other points; freight engines set evenly to cut off at half-stroke will not jar the nerves of listeners who are worried to hear an engine limping with one or two exhausts in partial desuetude."

Express Passenger Engines: Madras Railway

Railway Engineer (London), March, 1901, p. 69.

The engines here illustrated were built in 1899 to work the mail trains between Bombay and Madras, over the Madras railway section of the journey. They were built by Messrs. Kitson & Co., of Leeds, to general designs worked out by Mr. C. E. Phipps, locomotive, carriage and wagon superintendent of the Madras Railway. The boilers, cylinders, all gear, boiler mountings, etc., as well as the tenders complete, are duplicates of the standard goods and mixed train engines in use on the Madras Railway. The cylinders are 18x26 in. and the coupled wheels are 6 feet in diameter. The bogies are a special arrangement designed by Messrs. Kitson, side play being allowed for by swing links, each carried on two pins. The engines, as well as the carriages, are fitted with Winter's patent electric arrangement of intercommunication between passengers, guard and driver.



The line over which these engines have to work is a very heavy one, over 80 miles being on rising gradients of 1 in 100 and under, and nearly 200 miles on gradients of 1 in 200 and under, and with loads behind the tender aggregating 180 to 200 tons; the demand upon the engines is a very heavy one. The fuel used is from the Singareni Mines, which in common with more or less all Indian coals (though free burning and giving a very hot fire), is very dirty. A large quantity of ashes and small clinkers in consequence accumulate in the fireboxes. To get over this and save time in cleaning fires, Mr. Phipps has designed a simple and efficient arrangement for rocking the firebars. The bars rest on the firebar carriers on small semi-circular "pips" cast on them. A cast iron rod with projections passing up between each pair of bars is moved backward and forward by a cam on the trailing axle, into gear with which it is thrown by a lever on the footplate. This being thrown in shortly before entering a station, causes the firebars to oscillate, and so sift out the dirt and ashes from below without disturbing the fire on the top. The arrangement has been fitted to all coal burning engines on the Madras Railway, and has been found to be most effective. Another fitting with which the engines are provided is also perhaps worthy of notice, viz., that for picking up "line clear-tickets," when passing through stations. The tickets are folded up and fastened to a cane hoop about 15 in. diameter, this hoop being held in a claw on the end of a wooden arm running out from a post on the platform. A wooden rod fitted in a hinged socket on the engine is pushed out to a stop, and as the engine passes this goes through the hoop and takes it off the claw. The arrangement is, in fact, a mechanical "tilting at the ring." The hoops are picked up without fail at speeds up to 45 miles an hour, and at night, especially, much time is saved by its use.

[It will be noticed that the cab is open at the sides, front and back, which is quite understandable when it is remembered that the Presidency of Madras extends from below latitude 10 and above 18 degrees North.—Eds. R. R. Digest.]

Smokeless Firing

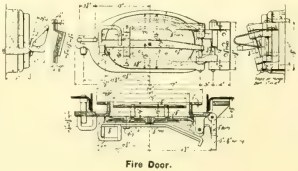
Common Carrier, March, 1901, p. 57.

Mr. C. A. Wickersham, president of the Atlanta and West Point, and the Western of Alabama, is giving practical personal attention to the introduction of smokeless firing on his road. He understands the method of educating the firemen himself. He says the firemen did not take to it at first. On one occasion when the president fired for a few miles on an engine running out of Montgomery, the fireman said that his method would make one's back ache. The president admitted that it would at first, simply because the fireman had not become accustomed to the method which called into play muscles not heretofore used; with use that trouble disappeared. Mr. Wickersham says that on this occasion he had the full co-operation of the engineer. This is a most essential adjunct to smokeless firing. Harmony on the foot plate is an absolute necessity for economical locomotive running.

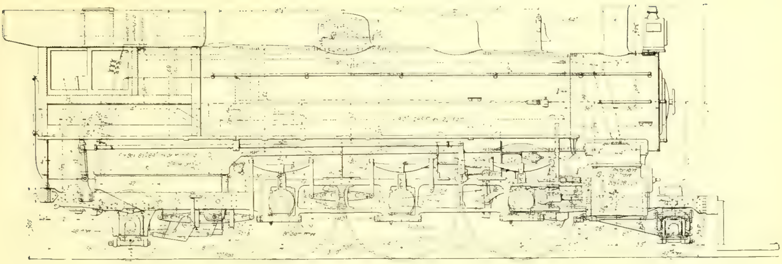
New Passenger Engine L. S. & M. S. Rly.

American Engineer and Railroad Journal, March, 1901, p. 69

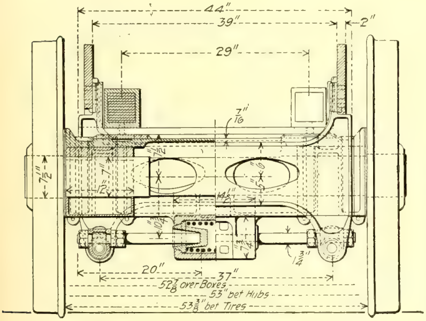
This new class "J" passenger locomotive engine was built at the Brooks Locomotive Works from designs by Mr. Waldo H. Marshall, Superintendent of Motive Power. The engine is of the "Prairie" type. "The chief aim has been to secure ample power, with a reserve for emergencies, in an engine carefully designed to avoid breakdowns. The design is bold," says the Engineer, "not in the use of uncertain factors, but in the assembling of such features as 3,343 sq. ft. of heating surface, 48½ sq. ft. of grate area, 19-ft. tubes, cylinders 20x28 in., six coupled driving wheels 80 inches in diameter and pony leading truck and radial trailers and piston valves." The Engineer has illustrated this engine



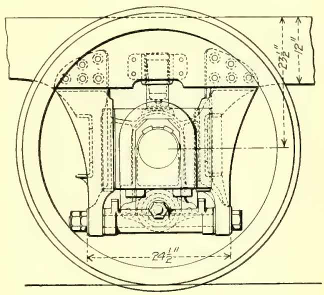
Fire Door.



with five and a half pages of details and a very effective half-tone double page inset. The boiler is long with conical wagon top and sloping throat sheets and back head. There is one fire-door opening, but two doors, the smaller one being used for firing, both being opened for cleaning and repairs. Everywhere weight has been minimized; and, where possible, castings were made to serve more than one purpose. The link hanger bearings, brackets for boiler brace, back of guide yoke, and spring hanger bearings for the front driving springs are combined in a single steel casting. The grate bar bearers are of pressed steel, making a packed joint with the firebox sheets and supporting also the ash pan. The weight on front truck is 21,500 lbs., on



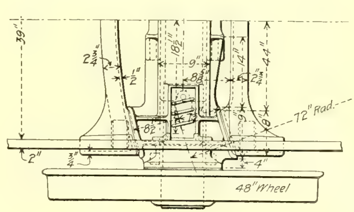
driver 130,000 lbs., on trailing wheels 23,000 lbs., total, 174,000. A patent has been applied for upon the form of radial trailer used in this engine, and in the recent "Chautauqua" type engines built by the Brooks Works. The frame of this truck is cast steel and the boxes are malleable iron. The boxes have spring cellars and a strong spring centering device. The wear from the load upon the ends of the radial casting is taken by case-hardened iron plates. The truck is simple and compact. It appears to curve easily and to promise very satisfactory service for this location under the firebox. There is also good reason to believe it equally promising for the front ends of engines to replace pony trucks. The Engineer calls attention to the unusually large number of details made of cast steel even in these days when this material is extensively used. The tender brings coal to the fireman, so to speak, the slopes being carried to the front, where they narrow to the coal grate. They are carried on Brooks' design of tender truck of the arch bar type, which are noteworthy for strength. The tenders are



fitted with the water scoop designed by Mr. H. F. Ball, Mechanical Engineer of the road, illustrated in the Am. Engineer for Nov., 1900, p. 344; (also in the Digest for Jan., 1901, p. 26.) The special equipment for this engine is as follows: Brakes, American for drivers, Westinghouse for train service; pump, 9½ in., Westinghouse; Nathan sight feed lubricator; Ashton safety valves; Hancock injectors; French springs and Brooks metallic packing for valve stems.

The Engineer speaks in terms of praise of the high degree of excellence which this engine possesses, practical, useful, and æsthetic.

[In looking at the large half-tone which accompanies the article, one is impressed with the beautiful proportions of

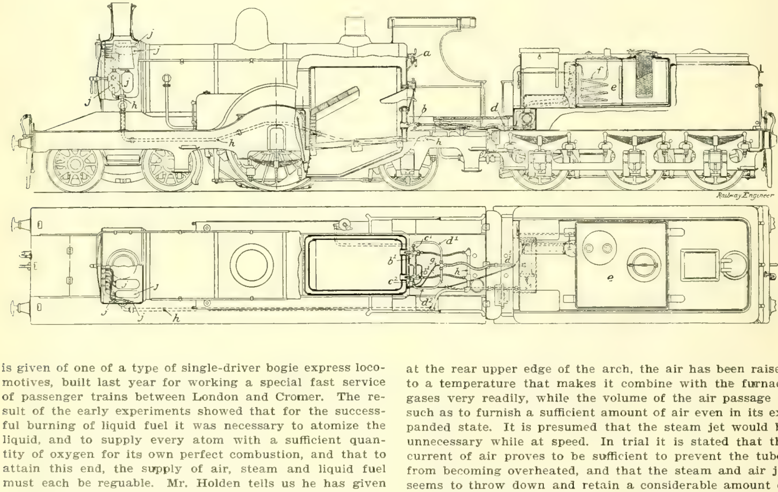


this 2-6-2-type engine, and is compelled to admire the graceful lines and the general sense of balance in the whole design. This fine looking engine is a result of hard work, and we believe it is true of good locomotive designing, as Grant Allen says of writing for the press, "'Labor, incessant labor, has the appearance of ease."—Eds. R. R. Digest.]

Liquid Fuel for Locomotives

Railway Engineer (London), March, 1901, p. 71.

Mr. James Holden, locomotive superintendent of the Great Eastern Railway, says he first employed tar from the company's oil gas works at Stratford, which was at the time he began operations entirely a waste product. Experiments were first made with the boiler of a stationary engine. In use in locomotive boilers Mr. Holden's idea was to use it as an auxiliary, and that engines should be equally adapted for solid or liquid fuel, or a combination of both. The burners were, therefore, designed to spray liquid fuel above the level of the coal fire, and to introduce air for combustion at such a point that to all intents and purposes the resultant fire should be distinct and separate from the lower solid base. The best form of burner was only arrived at after very considerable experience. To illustrate the present arrangement of apparatus, a general outline elevation is given of one of a type of single-driver bogie express locomotives, built last year for working a special fast service of passenger trains between London and Cromer. The result of the early experiments showed that for the successful burning of liquid fuel it was necessary to atomize the liquid, and to supply every atom with a sufficient quantity of oxygen for its own perfect combustion, and that to attain this end, the supply of air, steam and liquid fuel must each be reguable. Mr. Holden tells us he has given considerable attention to the action of the steam used for spraying the fuel, and, of course, introduced it into the firebox. Extravagant claims, he says, have been made that this injected steam, besides serving all its natural mechanical functions as a spraying agent, also becomes itself an auxiliary source of heat, the explanation offered being that when steam comes into contact with the intensely-heated fuel in the firebox it is decomposed into oxygen and hydrogen, and these gases then burn again with the evolution of great heat, and that in this way the steam itself becomes in effect a fuel. The radical error is apparent, for exactly the same amount of heat is required to decompose steam into its component gases as these gases would generate in recombining to form steam. Mr. Holden has, therefore, used every endeavor to minimize the quantity of steam used for spraying purposes. Compressed air doubtless has its advantages, but is, he thinks, undesirable on a locomotive, by reason of the machinery necessary for its provision. On the Great Eastern Railway coal tar and its by-products have been used, as well as those from the oil gas plant, and petroleum distillation residues, specially imported for fuel. With some fifty-eight engines equipped, the means of storage and supply must necessarily be somewhat considerable, and the arrangements at Stratford for this purpose, which are the outcome of considerable experience, are the most complete in Great Britain.



Experimental Arch in Italian Locomotive

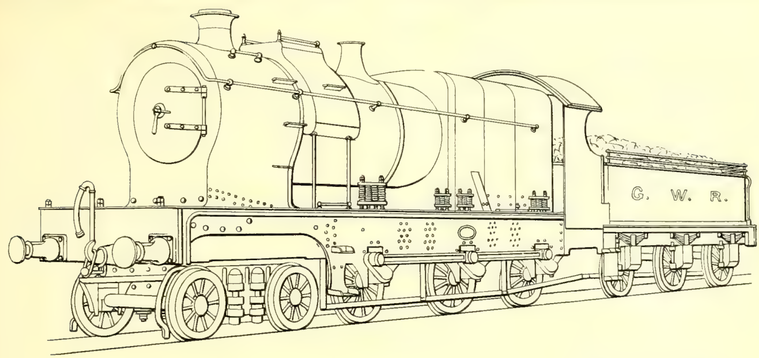
The Practical Engineer (Manchester), March 15, 1901, p. 248.

A locomotive recently constructed for mountain service in Italy was fitted with an arch, which is arranged somewhat on the principle now being experimented upon in this country. Beneath the barrel of the boiler a steam jet directed into a funnel induces a current of air in it. The small end of the funnel guides the air into a box pipe, which passes under the mud ring and up between the tube sheet and the arch to the upper forward edge of the arch. At this point it spreads out to distribute the current of air through a series of tubes laid on top of the arch. In passing thus far through the arch tubes, and finally emerging at the rear upper edge of the arch, the air has been raised to a temperature that makes it combine with the furnace gases very readily, while the volume of the air passage is such as to furnish a sufficient amount of air even in its expanded state. It is presumed that the steam jet would be unnecessary while at speed. In trial it is stated that the current of air proves to be sufficient to prevent the tubes from becoming overheated, and that the steam and air jet seems to throw down and retain a considerable amount of the incandescent particles and sparks which ordinarily fill the front end or pass out of the stack.

Speed of Express Trains in England and France

Moniteur Industrielle (Paris), March 2, 1901.

At present the fastest trains in England are those running between London and Edinburgh, via Newcastle. The distance is 395 miles and the quickest time made is 7 hours and 29 minutes, or an average running speed of 52.7 miles per hour. This is exceeded by a French train on the Southern Railway, where a distance of 486 miles is covered at an average rate of 54.1 miles per hour. This work is done by four-cylinder compound locomotives.



Six-Coupled Bogie Goods Engine

Locomotive Magazine (London), March, 1901, p. 40.

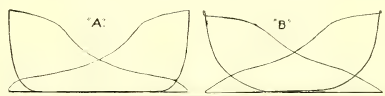
The remarkable Great Western Railway locomotive represented on this page, though not the first six-coupled bogie engine in the United Kingdom, is, we believe, the first to combine these features with inside cylinders and outside frames. No. 2601, which was built at Swindon last year, has six coupled wheels 4 ft. 8 in. diameter, with outside bearings, and a four-wheeled bogie with 2 ft. 10 in. wheels having inside bearings. The cylinders are 19 in. diameter by 26 in. stroke, and the boiler, which is provided with a Belpaire firebox and (on account of its great height) has no dome, contains 387 tubes and carries a pressure of 170 lbs. per sq. in. The smokebox is extended, and the cab is the full width of the footplate. The tender runs on six wheels, and carries 2,500 gallons of water. A novel feature is the sandbox, in the form of a saddle, on the front of the boiler barrel, and it will be noticed that steps are provided on the smokebox to enable the fireman to get at it for filling purposes. Engine and tender are fitted with steam and automatic vacuum brake.

[The engine, judged by its wheel arrangement, would be known in this country as a ten-wheel engine, or as a 4-6-0, in Mr. Whyte's classification.—Eds. Railroad Digest.]

Test of Cylinder Clearance

Railway Age, March 1, 1901, p. 171.

In Mr. Ira C. Hubbell's paper on "Some Suggestions with Regard to Fuel Economy," information was given regarding a test that has been made by a certain manufacturer of stationary engines to determine the percentage of clearance absolutely necessary in a cylinder to accommodate the compression inseparable from certain valve movements. The engine in question had a cylinder 14x14 in., and at the time the test took place, no determinations were made to ascertain the direct effect of clearance upon the question of steam economy. The engine subsequently tested was made by the Allfree Engine Company of Indianapolis, and later the company has conducted an exhaustive test relative to this question of the effect of clearance upon steam economy. In the test the engine was loaded by brake pressure, and indicator cards taken every two minutes. The exhaust steam was condensed and weighed. The clearance was 2.2 per cent. The average h.p. was 95, the total water consumed was 2,255 lbs., and the average number of pounds of water per indicated h.p. was 23.72 lbs., making no allowances or deductions on account of entrainment or other possible losses. The valve is the plano-convex type, the flat surface forming the face, which permits of very short and direct ports. The indicator card A, is a fair sample of those taken where the foregoing conditions obtained. The data for this card are as follows: Cylinder, 14x15 in.; piston rod, 2⅛-in.; sprig, 60; boiler pressure, 105 lbs.; revs., 172; clearance, 2.2 per cent. After this test, the piston was removed and a shorter piston substituted, so as to increase the clearance from 2.2, up to 6 per cent. At the same time the Allfree expansion valve gear movement was cut out and the Allfree automatic valve movement, which is not altogether dissimilar to the ordinary automatic valve movement employed by the several builders of shaft-governing automatic engines, was substituted. This, as shown by the indicator cards, yields a very excellent steam distribution for this class of engines. After this change another test was made exactly as before, the average indicated h.p. developed being 94.27 and the total pounds of water consumed per hour being 2,673, or an average of 28.35 lbs. per indicated h.p. per hour. Below is given a fair average indicator card marked B, from the engine with the 6 per cent. cylinder clearance. Data for this card follow: Cylinder, 14x15 ins.; 2⅛-in. piston rod; 60 spring; boiler pressure, 98 lbs.; 172 revs. per minute; cylinder clearance, 6 per cent. The results obtained seem to establish the fact that



filling the clearance space with compression does not necessarily wholly compensate for the loss due to clearance, as a careful examination of the cards A and B reveals the fact that in both instances compression is brought practically to the boiler pressure, in fact, slightly above in the series B, although not enough to cause an appreciable loss.

This test was undertaken to determine accurately the effect of cylinder clearance on steam economy and to anticipate, so far as possible, the resulting economy in locomotive practice with low clearance cylinders, the valve movement permitting the reduction of clearance.

The Economical Load

Railway and Locomotive Engineering, March, 1901, p. 116.

Amidst all that has been going on for the past few years about the tonnage rating of locomotives, one important phase of the question appears to have been overlooked; that is, the economical load of a locomotive. It seems always to be assumed that the last ton it will haul over the prevailing grades is the economical load, but, says the editorial writer, we are inclined to believe this to be a popular

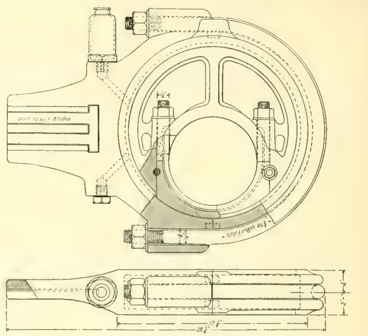
delusion, arising from the desire of transportation officers to have as many tons as possible moved by each engine without regard to the speed of trains. The rapidity with which stock and perishable goods are moved by giving the engine tonnage that can be handled easily ought to provide a basis on which to figure the earning powers of engines that are loaded differently in proportion to their powers. Locomotive Engineering believes that an engine loaded to go over a division at a rate of 18 miles per hour would earn more money for the owners than one loaded to make a speed of 12 miles per hour. The argument which is put forward to support this opinion is based on a very careful analysis of the economy and convenience of different train speeds. An example is taken, two engines being tested as follows, one hauling 700 tons over a division 150 miles long at a speed of 17½ miles per hour, the other hauling 800 tons over the same division at a rate of 10 miles an hour. Assuming that each lies in the roundhouse 7 hours at the end of each run, then at the end of 24 hours the faster moving engine will be found to have made 420,000 ton-miles, as against 148,000 ton-miles of the slower engine. The profitable performance of the first was 54½ per cent. better than that of the second.

Another drawback which the slow-moving train introduces into the problem of economical operation is that on lines where stations are far apart it frequently fails to make its meeting points, and has to lie in side tracks, wasting time and fuel. A superintendent of a trunk line is quoted as saying that whenever there was a congestion of traffic on his division he invariably cut down the tonnage on his trains, as that was the only way he could keep the road clear. The question of why officials generally do not realize the advantage of speed in train movement is answered by referring to what is almost a railroad tradition, that a car left behind which an engine could pull represented so much delay in the movement of freight. A most grievous sinner in the matter of overloading engines is clearly pointed to by Locomotive Engineering in this article. He is the average yardmaster, plus his assistants. When a yard is becoming congested with cars, these people do their best to put behind every engine all the tonnage it can move out of the yard, regardless of what delays may happen on the road. Another fallacy, at least in stating the earning power of a locomotive, is also touched on; it is the saying, "locomotives were built to haul cars, and the more they haul the better for their owners." The maximum ton-miles made by the engine referred to above in the 24 hours is a sufficient answer to this superficial statement. The point of steam cut off is also a factor in the problem. Every engine has this point of greatest economy in fuel consumption, and this point also generally represents that at which the engine can be operated with the least wear and tear of the machinery. These considerations bring up the saving of fuel and the saving in cost of repairs. The overloaded engine is wasteful of fuel, is literally overworked, and goes to the repair shop earlier than it ought to go. The conclusion to be drawn from a careful consideration of the case is that the moderately loaded engine earns most money for its owners.

A New Eccentric and Strap

Railway Master Mechanic, March, 1901, p. 82.

The accompanying sketch illustrates a new method of fastening the eccentric strap over the eccentric, and also of attaching the eccentric to the driving axle. It will be seen that the strap is made in halves, and instead of lugs and bolts, only one bolt is used, which passes around and encircles the back half of the strap. Each end of the bolt passes through two extra strong lugs on the front half of the strap, permitting the two parts to be securely and rigidly fastened together, which also allows of a free and easy movement of the eccentric within the strap. The eccentric is light and strong, and is made in two parts, being clamped to the axle very securely by the yoke passing around the driving axle, thus drawing the eccentric tight to the axle, instead of forcing it away, as in the case with set screws and keys. The lower portion of the eccentric provides a continuous bearing for the strap and also acts as a

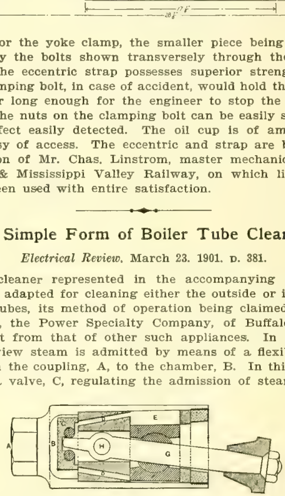


cover for the yoke clamp, the smaller piece being kept in place by the bolts shown transversely through the eccentric. The eccentric strap possesses superior strength, and the clamping bolt, in case of accident, would hold the halves together long enough for the engineer to stop the locomotive. The nuts on the clamping bolt can be easily seen and any defect easily detected. The oil cup is of ample size and easy of access. The eccentric and strap are both the invention of Mr. Chas. Linstrom, master mechanic of the Yazoo & Mississippi Valley Railway, on which line they have been used with entire satisfaction.

A Simple Form of Boiler Tube Cleaner

Electrical Review, March 23, 1901, p. 381.

The cleaner represented in the accompanying illustrations is adapted for cleaning either the outside or inside of boiler tubes, its method of operation being claimed by the makers, the Power Specialty Company, of Buffalo, to be different from that of other such appliances. In the sectional view steam is admitted by means of a flexible hose through the coupling, A, to the chamber, B. In this chamber is a valve, C, regulating the admission of steam alter-



nately to the ports, DD, through which it flows to the cylinder, E, operating the steel piston, F. The movement of this piston causes the arm, G, to vibrate; this arm is pivoted at H. The rearward extension of this arm operates the valve, C, by striking the steel shoulders, H. On the end of the arm, G, is a hammer, J, held in place by a nut.

It is claimed that this apparatus is highly efficient in operation and that its singular hammering and blowing action accomplishes very desirable results.

[How would compressed air do, to operate by?—Eds. Railroad Digest].

The Number of Locomotives on British Railways

Mechanical Engineer (Manchester), March 2, 1901, p. 305.

The number of locomotives on the twenty English, Welsh and Irish railways at the close of last year, according to an official return, was 16,682, distributed as follows: Belfast and Northern Counties, 73; Great Central, 848; Great Eastern, 1,041; Great Northern, 1,251; Great Northern of Ireland,

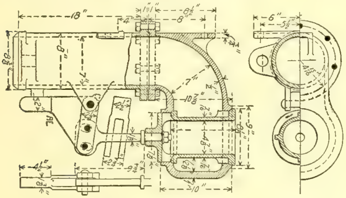
147; Great Southern and Western of Ireland, 201; Great Western, 1,988; Lancashire and Yorkshire, 1.318; London, Brighton and South Coast, 489; London and Northwestern, 2,475; London and Southwestern, 733; London, Tilbury and Southend, 62; Metropolitan, 83; Metropolitan District, 54; Midland, 2,615; Midland Great Western of Ireland, 127; Northeastern, 2,121; North Staffordshire, 161; Southeastern and Chatham, 697, and Taff Vale, 198, making 16,682 in all. At the close of 1899 the total was 16,174. The increase in 1900 was therefore 508.

Improved Locomotive Throttle

American Engineer and Railroad Journal, March, 1901, p. 96.

The throttle valve illustrated by this engraving was designed with a view of taking steam from the top of the dome only, thus preventing the admission of wet steam to the dry pipe, which must necessarily occur at times with the ordinary throttle taking steam from both top and bottom of the valve. It is believed that the difference of 10 ins. in height, which is the height of the valve in this case, will have a marked effect upon the dryness of the steam.

The drawing shows the construction very clearly. The opening in the dry pipe under the valve is closed by a close-fitting circular plate, and, by making the valve hollow.



steam may enter the pipe under both the flanges of the valve, but it must all come from the space in the dome above the valve.

The engraving also shows the double pin leverage of the bell crank which operates the throttle. During the first part of the movement of opening, the bearing of the valve is upon the inner pin. This gives a greater leverage and slower motion to the valve than it has during the remainder of its motion when the outer pin takes the weight of the valve. This feature, however, is not new.

The Baldwin Locomotive Works supplied the drawing of this improved throttle, which was the subject of a patent by Mr. K. Rushton.

Car Equipment, Appliances and Related Matters

Light and Heavy Freight Cars

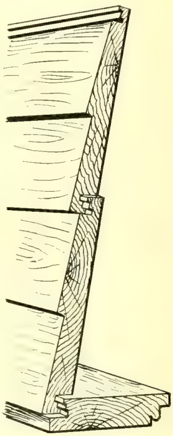
The report of the committee of the Central Railway Club on "What results are being developed in the old class of freight car equipment by the introduction of the heavy type of locomotives and the larger number of 60,000, 80,000 and 100,000 lbs. capacity freight cars that are being placed in service" was presented at the annual meeting in Buffalo. The result of inquiry leads the committee to the conclusion that the cars referred to have, and do, suffer more damage since the introduction of heavier locomotives and larger cars. The damage is usually to end sills, body bolsters, draw timbers and center sills. In order to keep the cars in service it has been found necessary to increase the size and number of draw timber bolts used when applying new draw timbers. It is stated that when the bodies of cars are in good condition, the general practice has been to put these timbers up in accordance with the M. C. B. standard, given in the published proceedings of the association on plate B. In order to obtain the best results more than ordinary attention has had to be paid to keeping the nuts well tightened up. That statement would naturally direct attention to the question of efficient nut locks, as a possible very considerable help in this direction, though the report does not raise the question.

The old class of freight cars were intended to be hauled in trains of about 625 tons, whereas they now are often placed at front or rear ends of trains of about 2,000 tons weight, and the limit has not yet been reached in this matter. The advent of the M. C. B. coupler has apparently increased the rough handling of cars in yards, and so has a tendency to accentuate the severe test produced by modern conditions.

The report concludes with the statement that as a rule, when a light capacity car requires repairs estimated to cost $60.00, it is replaced by one of 60,000 lbs. capacity, and so it becomes merely a matter of time before the old class of car will disappear altogether.

A New Timber Joint

American Lumberman, March 16, p. 45.



Eugene F. Harris, James F. McCune, G. W. Powell and E. Frazier, all of Indianapolis, are jointly interested in a timber lock joint, for which a patent was granted on November 14, 1899 (No. 637,212). A company will soon incorporate, which will probably be styled the McCune Timber Lock Joint Company, Mr. McCune a practical woodworker of twenty years' experience, being the inventor. The design is applied very successfully to car siding, preventing the joints from opening. It is also used for car roofing, a double thickness, with joints broken, being impervious to water without the usual middle layer of sheathing paper. It has been in actual use in this direction for the past year, and a large contract is now pending. The device also applies to wooden elevator spouting, etc. The accompanying illustration shows it as applied to house siding as worked from 1x6-in. stock, ½ in. being taken in the lap, the face of the stock being worked to give the effect of narrow siding. It is intended to offer this device to planing mill men upon a royalty.

The cut also shows the method of applying the joint upon a square corner, as in elevator spouting, corner boards, etc.

Light Weighing and Re-stenciling of Freight Cars

Railroad Men, March, 1901, page 266.

The American Railway Association recently adopted a rule providing for the light weighing and re-stenciling of freight cars, viz.; "New cars shall be stenciled, when built, with actual weight, date of weighing and capacity, and shall be re-weighed and re-stenciled at the end of the first and second year thereafter. Cars receiving repairs of such a nature as to change their weight, shall be weighed and stenciled. New weights of foreign cars shall be reported to car owner." This is a matter of importance which cannot be emphasized too strongly. It has been found that box cars will depreciate in weight five per cent. or more. In one lot of 500 box cars, re-weighed about one year after building, there was an average depreciation in weight of 1,575 lbs. per car. Under the prevailing method on many roads, of operating engines on a tonnage basis, it is quite important that as nearly correct

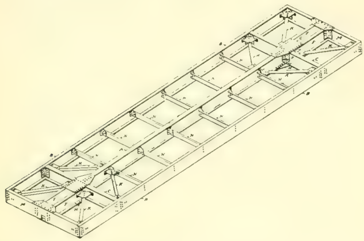
weights as possible be had; and furthermore, the weighing of loaded cars and using the stenciled weight to arrive at the tare, makes thousands of claims for overcharging in weight, which would not occur if the stenciled weights were correct.

Steel Framing for Freight Cars

Proceedings Western Railway Club, Chicago, March, 1901.

Mr. G. W. Scott read a paper on this subject, in which he said: "Increased carrying capacity implies increased strength in that which is to do the carrying." The industrial growth of the country has provided means whereby increased strength may be easily secured. The manufacture of commercial shapes of steel affords both builder and designer the requisite for cheap and durable forms of construction. Something more than merely being made of steel is to be considered if a satisfactory and economically constructed car is what is wanted. The speaker gave a few notes as to what constitute fundamental requirements in car design.

In general construction the car consists of a single centre sill of I-beam section, with ends abutting against the body bolsters. The bolsters, also of similar section to the

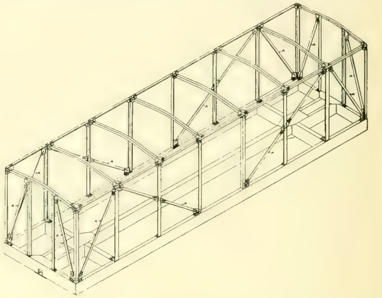


one centre sill, are each made in one piece, with ends framed with the side sills. The side sills of channel section run from end sill to end sill. Draw beams of I section, which extend from body bolsters to end sills, enclose the drawgear. The end sills are made of channel bars, pierced in the centre for the drawbar, close to, but preserving the bottom flange intact. All these members are of uniform depth, so that cover plates are easily applied where draw frames, body bolsters and centre sill meet, and at the joint made between draw beams and end sills. Diagonal braces, four at each end, add to the stiffness of the structure and are intended to transmit corner shocks to the rigid connection at the centre of the bolster and to the centre sill beyond. A wooden floor is used, and the floor beams extending from centre sill to side sills, while acting as lateral stiffeners, carry suitable floor joists. The use of standard commercial shapes renders calculations for weights and strength very easy. This system of underframing is applicable to flat, gondola dropbottom, hopper bottom, or box car. The floor and superstructure alone differing in each case.

The skeleton structure of a box car is also shown. The under frame being alone sufficient to carry the load, the upper framing may be of wood or steel, as required. The use of angle and T-section carlines results in a decided gain in head room. Wood or steel may be used for car siding, lining or roofing.

An objection, the speaker admitted, might be raised as to whether this car would not be heavier than one constructed of framed steel shapes. He, however, pointed out that for fair comparison the dead load should be expressed in terms of the ultimate carrying capacity of the car. In other words, for a given form of loading, say uniformly distributed, what is the factor of safety, considered with reference to the static load of so many thousand pounds. Stencilled capacity is scarcely sufficient for purposes of comparison.

[The features briefly stated which strike an observer favorably are, among others, that the push and pull of the draw gear is in line with the centre sill. Commercial shapes are used which permit of close calculations as to weight and strength. The under framing is designed to carry the load and stand shocks without assistance from the superstructure. Head room may be gained if angle or T-section carlines be used, and probably a little side room would be

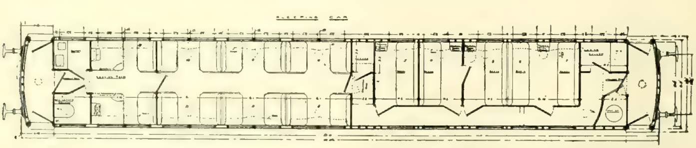


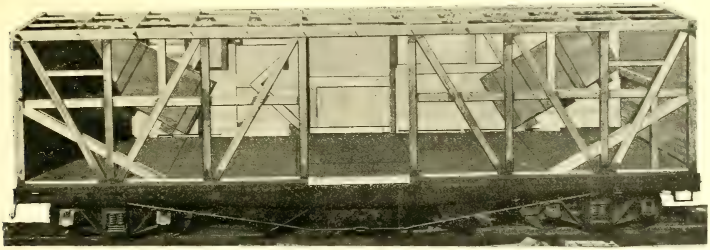
gained also. The construction appears to be strong, simple, durable, and ought to be comparatively cheap.—Eds. Railroad Digest.]

New Sleeping Cars—Midland Railway

Locomotive Magazine (London), February, 1901, p. 36.

Four handsome sleepers have been put running on the Midland Scotch service; the bodies of which have been built by the Pullman Co. The cars are built on a modification of the standard Pullman model, and each has sleeping accommodations for eleven passengers only, there being no upper berths; and, of those enumerated, five are located in separate staterooms, to which access is gained from a side corridor. A small buffet is provided from which the attendants can supply light refreshments to passengers. The framing of the car body is of the substantial character usual with Pullman built vehicles. The bogies are of Midland design and construction, with wheel bases of 12-ft. 6-in. each; all the running and draft gear is by the railway company. The heating is provided for by a Baker double coil heater, with attachments for steam from the train pipe. Oil-gas light is fitted with roof lamps on either side of the clerestory of the roof.





The Manning Convertible Car

Railway and Engineering Review, March 23, 1901, p. 204.

The Manning car is designed for service where coal is hauled in one direction and grain or merchandise in the other. The main feature is provision for chutes through the under framing. The opening to these chutes in the floor of the cars is usually covered by two trap doors. They are hinged so that when they open they swing up back to back and join to form a triangle-shaped projection over the floor of the car opposite the side doors. At either end of the car, doors are hinged to the sides, which drop down to form end inclines when the car is to be used as a hopper-bottomed car. When the trap doors are up and in position and the end inclines folded down in place, the floor becomes in section like the letter W, the two lower angles of the letter being, of course, below the normal floor line. When used for grain the car interior is that of an ordinary box car. There are two small side doors in either end (similar in position to those in the "Handy Car" shown on page 104 of the Digest for March), through which the coal can be loaded, as the side doors would not then be fully available. The small side doors are, of course, available at all times for loading and unloading. At present the car has been built as an experiment, the doors and inclines being of wood and covered with iron sheathing. The end inclines make an angle of 30 degrees. In a test, a full load of bituminous coal was completely discharged in 20 seconds. One man can quickly change the car from box to hopper and vice versa. The car was made from designs by Mr. W. T. Manning, consulting engineer of the Baltimore & Ohio Railroad. [The original car was loaded with 30 tons of coal at Fairmount, and on arrival at Baltimore was dumped in about 20 seconds. Then it was reloaded with oysters in buckets and sent to Chicago on first section of train No. 7, arriving safely, where it was loaded with grain for Baltimore.

The inventor claims that it is the only hopper-bottom box car in the country and the only one that has satisfactorily carried such varied freight. The B. & O. Railroad is now having another constructed at the Mount Clare shops. The new car will have wooden underframing, though otherwise it will be similar to the car now in use.—Eds. Railroad Digest.]

A Pneumatic Tool Car

Railway Master Mechanic, March, 1901, p. 70.

Mr. W. H. Finley, principal assistant engineer of the Chicago & Northwestern Railway, has recently designed and fitted up a pneumatic tool car, from which great things are expected by the bridge and motive power men. It consists of one 15 hp. Otto gasoline engine, one 6x8 horizontal Ingersoll-Sergeant compressor, one air tank, two cooling tanks and one gasoline tank, all mounted on a flat car. There is also 600 feet of hose and piping with connections to the air tank, so that three sets of tools can be used at once. All the tools are of the latest and largest capacity. When necessary, the machinery can be removed from the car. It is of great value in repairing bridges, and convenient for new bridge work. The engine and compressor are controlled automatically, and so the plant requires no particular attention except as to lubrication.

Railway Passenger Communication with Drivers and Guards

Mechanical Engineer (Manchester), March 2, 1901, p. 305.

Some time ago a committee was appointed by the Board of Trade to consider the best means of communication between the passengers and the railway servants in charge of trains. The committee's report was duly considered by the associated railway companies, with the result that it was decided by a majority to adopt as the means of communication between passenger, driver and guard the partial application of the air brake, that being one of the systems referred to in the committee's report as being efficient. The system has been applied to a considerable portion of the total stock of the Southwestern Railway Company, and the work is to be continued until the whole of the stock is fitted. Passengers are able to work the appliance from either of the four corners of the compartment by simply pulling a chain fixed just above each quarter light.

Shop Practice, Machinery and Tools

Modern Shop Practice

Engineering (London), March 8, 1901, p. 309.

On March 2 the Association of Foremen Engineers and Draughtsmen met in London to hear and discuss a paper read by one of their number, Mr. E. Amos. The title of the paper was "Modern Shop Practice," and it contained much practical information on the several subjects treated. Foreign foundry practice was held up as an example that should be followed, although it was pointed out that American foundrymen were apt to pay too much attention to the appearance of their work, and thus sacrifice strength. It was acknowledged that British engineers are slower to adopt improvements than those of other countries, but the fault of this was laid upon the public, which insists on having cheap things. "Engineering" thinks that the blame rests on the backward engineers, who produce inferior things "in an inferior way." They cannot very well help this, as their engines of production are old-fashioned, and their employers neglect to spend one sovereign to bring back two.

Air-driven tools were discussed at length by Mr. Amos, who is interested in them. He said that the pneumatic riveter had a great advantage over others in constructional work on account of its portability. In regard to chipping cast iron, the pneumatic tool did not show to as much advantage as on wrought iron. The success of the pneumatic tool depends very much on the physical characteristics of the men, as developed by practice. In the Loewe Works, at Berlin, they are used with great success. The sand blast for cleaning castings was found to be very useful when two hoppers were used; a more favorable method, however, was the pickling of castings. The process is cheap, and in twenty-four hours all the sand can be removed by a weak solution of acid, as every grain is found by the acid.

A Workman's View of the Premium Plan

American Machinist, Feb. 7, 1901, p. 142.

Mr. W. A. Waterman, of Providence, R. I., writes to the Machinist in favor of the Premium Plan. He refers to the experience of the ten firms, published by that periodical in its issue of Dec. 13, 1900. (Digest for January, 1901, p. 38.) He thinks the success they have had with it is a good argument in its favor. He believes that the plan is good, but that its acceptance may be made or marred by a foreman under whose supervision the details are worked out. He instances the case of a man, able to make .02 cents per hour above his day's pay rate, and another on the same work being able to make .10 cents per hour, and he holds that the latter is the better workman of the two, and should be allowed to enjoy the fruit of his superior skill. He insists that the fundamental principle upon which the success of the premium plan depends is that the time limit should never be altered by the proprietors or others in authority, unless the machine upon which, or the facilities by which, a piece of work can be done are very considerably improved by the machine shop owners. For example, if a piece of work is done on a certain old-fashioned lathe, with a set time limit, and if later a new modern tool is introduced, then, and then only, the management has a right to rearrange the time limit. Reasonable workmen, he thinks, could not object in such a case. The writer instances a piece of work which, when first tried, took 17 hours, a repetition of the same job reduced the time to 11 hours, and the third time it only occupied 5 hours, which was the maximum performance of the workman. "Why did the premium plan effect so much? Just because the workman knew that the time limit once set would not be changed." That part of it is a *sine qua non*. Mr. Waterman thinks the premium plan beneficial alike to master and man.

[The Premium Plan referred to is the one bearing the name of its inventor—"The Halsey Plan."—Eds. Railroad Digest.]

American Methods and Men

Engineering (London), Feb. 22, 1901, p. 247.

This is a letter from Mr. Harrap, who, it is said, as a preparation for the management of his father's iron works, has been serving as a machinist in several American shops. He says that as he had so often heard of the American's ability to build and duplicate machines which were superior to those of Europe, he left England and obtained a position in an American machine shop. He has found many differences in the two countries, the principal one being the eagerness to suggest ways and means in America. He has learned much in the specializing of machines and parts. He finds the mixed population of the United States to be beneficial, since out of its conglomerated ideas many good ones come. The workmen, while not "sassy," have some confidence in themselves and are quick at picking up new things. He says that if England only possessed a body of men like the American toolmakers, she would laugh at all competition. The great difference between American and British workmen, according to the writer, is that the former are encouraged and paid for any new idea or scheme they may have, while the latter are discouraged or ridiculed for their originality. Hence many Englishmen who love Albion prefer to make this country their home. Their sympathies and aspirations are in the British Isles, but their opportunities are in America. Mr. Harrap says that the aptitude with which Americans utilize labor and time-saving devices accounts for their rapid strides in commerce. This it is which enables them to use higher priced labor, work a long distance from foreign markets, but nevertheless underbid all competitors. Detail is the keynote. When the American workman has an idea which is new and good it is likely to be endorsed. Even though it saves a few coppers, it will receive the attention of every man in its particular line. In Britain the reverse is true; objections are showered on a new invention, and because it may save only a little, it is declared to be "not worth bothering about." This attention to detail in America is another great factor in its material progress. The writer urges the encouragement of new ideas and schemes for saving labor, from whomsoever they may come, and wisely says that it is but poor policy to rely on a few men, even though they may possess most fertile brains.

Speaking of where he would rather live, he quotes with approval a fellow-exile who declared: "If I were a wealthy man this country couldn't hold me a minute. I would live in England, where art, literature, science and honorable men would be my acquaintances. But I am not a wealthy man; I work by the week, and receive pay according to my ability; therefore I would much sooner live here." He further endorses this opinion by saying: "I know plenty of Scotch and English mechanics in this country that would much rather live in Great Britain if they had a 'show' of getting on as they do here; they would rather live under a government of clean politics, that gives law, justice and proper interests to its citizens, such as England provides."

Mr. Harrap advises "pithy" advertising that will bring before the public the salient features of the machines advertised, and concludes by remarking that if these things are attended to, there is no reason for England to fear the commercial outlook, since her manufacturers have the advantages of a fine geographical position, and a good and well-established business reputation.

COMMENTS ON MR. HARRAP'S LETTER.

Engineering (London), March 1, 1901, p. 280.

A correspondent, signing himself "W. H." and writing upon the theme introduced in Mr. Harrap's letter (see preceding Digest), says that as a former journeyman who has spent seven years in American shops, he is entitled to point out one or two points in which, he thinks, the British are superior to the American shops. He thinks that if American workmen came into British shops in large numbers they would do a certain amount of good by stirring up slow places, but that the moral tone of masters and men would be lowered. He holds that as every one is trying to get ahead of the other in the United States, the men do not

trust each other, and therefore one of the features of an American shop is the petty, sneaking, tale-bearing character of the men. This, he thinks, may be an ideal state of affairs for the employer, but bad for the men themselves. He believes that British workmen have as much brains as American, and he enters a strong protest against the American habit of "bragging." He says: "Their supposed genius for invention is nothing that any man could not do who gave his attention to it. The enormous amount of trash registered at the United States Patent Office is evidence of that, only one article in twenty-five ever paying expenses." "W. H." also objects to the long week of 60 hours, and few holidays which obtain in America.

A MANAGER'S COMMENT ON MR. HARRAP'S LETTER.

Mr. Wm. Cattell, A. M. I. Mech. Eng., writes from Newport, Salop, saying that he cannot believe our American cousins have a monopoly of brains, but that employers in the United States encourage their men to use their intellects when at work. He also believes that workmen are snubbed by foreman in England, and as a manager himself, Mr. Cattell urges English managers to adopt the American method of encouragement, which he has himself tried with very beneficial results. He says one would be surprised at the amount of intellect that lies dormant in British workmen for want of a little encouragement. Mr. Cattell also wishes to see the British patent laws framed to come within reasonable limits.

MR. HARRAP'S LETTER.

New York Times, March 25, 1901, p. 6.

This writer has sent to London Engineering the explanation his observations have suggested for the success with which our manufacturers are invading the markets of the world. It is a matter of methods, not of men, he says. The American workmen he finds no better than those of England, but here they are encouraged to suggest improvements to their employers, and when they make an invention they are allowed to profit by it. In England, on the contrary, the workman with a new idea is suspected of plotting to secure his foreman's job, and is lucky if he escapes discharge at the cost of a snubbing. Here anything will be tried that promises reduction of cost, but there it is not so, in small matters. Curiously enough, the writer of the letter doesn't seem to like the United States as a place of residence. He credits us with common sense, but charges us with "an overpowering lust for the dollar," and says that if English and Scotch mechanics could get in England the "show" they have here they would all prefer to live at home, "under a government of clean politics, that gives law, justice, and a proper interest to its citizen."

The Times considers this latter not a very terrible arraignment, but seems to think the desire to live on the other side of the Atlantic, and the reasons given therefor, are the result of homesickness.

Electric Equipment, Machinery and Appliances

Present Position of Underground Electric Railroads

Engineering Times (London), March 1901, p. 121.

Engineers have, of late, been eagerly looking for information regarding the twin tunnel electric underground lines of London. The three which are in operation are furnishing those concerned in the construction and equipment of similar railways, with valuable object lessons. In the Waterloo and City, the Central London and the City and South London Railways, there are features which it is said will be absent in later undertakings of their kind. The question between "close fitting" or large diameter tunnels has not yet been fully settled. Uncertainty still exists whether light locomotives as on the South London, or heavy ones as on the Central London, are the right things? Another moot question still exists, whether multiple unit methods, of which there are several available, are not capable of providing a satisfactory solution of the whole problem. The "close fitting" tube principle is being avoided on the Great Northern and City Line, now in course of construction. Its tube is 16 feet in diameter. The object of this is to improve air circulation and ventilation. It will also have the effect of reducing train resistance, with a resulting power economy. The first cost of the larger tube is of course heavier than that of the "close fitting" type, but such wide construction permits the company to take advantage of the use of the largest rolling stock manufactured, if it so desires. One other point of difference between this and previously built lines is the substitution of brickwork in cement for the lower half of the tunnels. This, it is believed, will greatly reduce danger of vibration and further, the Great Northern City Line intends to use "multiple unit" traction, with the motors distributed throughout the length of the train on the different carriages. The City and South London Railway, however, deserve much credit for the very valuable pioneering work which it has accomplished, and though it was started eleven years ago, not a single complaint as to vibration has been made by the residents of the streets above. All the roads are paying dividends, although as yet they are small. The Central London working expenses are 58 per cent. of the receipts. The Waterloo and City below 55 per cent., and the City and South London 56¼ per cent. The Central London—"the two-penny tube"—is carrying something like thirty millions of passengers per annum, the Waterloo and City about four or five millions and the City and South London considerably more than ten millions.

Electrical Experts to Examine American Methods

Iron and Steel, March 23, 1901, p. 7.

A dispatch from London states that the managers of one of the chief railway systems of Great Britain have commissioned two of the ablest of the electrical engineers of Great Britain, Messrs. Deeley and Woolliscroft, to come to the United States to study exhaustively American railway methods and especially the employment of the three-rail system, as it is done in some parts of New England and in Chicago. The engineers are also to inspect the sub-trolley electric systems that are in operation in Manhattan.

The Telautograph

Railway Engineer (London), Feb. 1901, p. 55.

The Telautograph, or writing telegraph, is the invention of Mr. Foster Ritchie. Its advantage, if used in railway work, is that it presents an indisputable written record of messages sent, in which even the handwriting of the sender is fac-similed. The telautograph appears to have all the good features of the telephone and writing telegraph, without any of their drawbacks. The writing is done on a scroll of paper 5 inches wide with an ordinary pencil. The illustration shows this pencil, when held in the hand, to be always at the apex of a triangle, the two sides of which are connected with corners of the writing desk, and the base line of which triangle is the width of the writing space. It is exactly as if a writer sitting at his office desk should have his pen connected, by pieces of thread or string, with the two corners of his writing pad, remote from the edge nearest his body. The base of the triangle so made would obviously be the edge of the pad farthest from his body. At these two corners are rheostats, and the movements of the brushes, which extend from pen to rheostat, throw more or less of the resistance in the rheostat into circuit, thus changing the amount of current passing into the line. This produces precisely similar movements in a similarly "triangularly held" pen at the other end of the line, and so produces on the distant paper a fac-simile of the writing, drawing, figuring, shorthand or other characters which may be made by the operator. After a message has been written it can be corrected, as the vertical motion of the pencil at one end is reproduced at the other. Appropriate electrical mechanism moves the paper down so that line after line may be traced. As the receiving instrument uses a pen instead of a pencil, the reproductions

are written in ink. There is also a paper cutter attached to the instrument. The receiver is automatic, and messages can be written without any one being present at the receiving end, and, being silent, insures safety in business transactions. Any one who can write can operate it. A telephone is attached, and questions relative to the message may be asked, answers given, and, after conversation, a formal, signed contract may be drawn up between persons widely separated by miles of sea and land, or a principal might draw a plan or sketch and discuss it with his subordinate as fully and in as much detail as if both were seated at the same desk. A technical description of the electrical action of the instrument and flow of current is given.

Railway Signaling Club

Railway and Engineering Review, March 30, 1901, p. 219.

At the March meeting of the Railway Signaling Club Mr. C. C. Rosenberg, signal engineer of the Lehigh Valley R. R., submitted the following question for discussion: Is the expense of putting spare spaces in interlocking machines warranted unless it is definitely known that they will be used within a reasonable time? "A reasonable time" was taken to mean the life of the machine. Mr. John Cade, of the Standard Signal Company, said that spare spaces should be used in any event, as the tendency when installing a plant is to load up the levers to their full capacity; and, if the track arrangements are afterward altered, it is usually found to be desirable to reduce the load on the levers and use up the spare places. Mr. Gillingham, of the Hall Signal Co., preferred to install just the number of levers required, making the frame of the machine long enough to add new sections as demanded. Mr. Rosenberg also asked whether an automatic signal repair man should be assisted by battery and lamp men, and how much track each should look after on the basis of signals one mile apart. The question was discussed pro and con. Mr. Gillingham thought that, as a general rule, better results may be expected by concentrating the duties of the repair men and holding them responsible for the maintenance of all the devices under their charge. The question as to which was the most suitable track relay resistance was discussed, and the prevailing opinion was that the 4-ohm relay is to be preferred. The relative merits of semaphore and disc signals was also discussed. The consensus of opinion seemed to be that the semaphore is preferable in foggy weather, but is more expensive than the disc signal. A member from the "Big Four" road stated that in the experience of the locomotive engineers of that road, yellow lights, under unfavorable atmospheric conditions, such as the presence of smoke, fog or steam, are more liable to be mistaken for white lights than for red lights. Others of the members thought that in the presence of smoke and steam the yellow light gives a decidedly reddish appearance.

Improvements in Machine Telegraphy

Electrical World and Engineer, March 16, 1901, p. 432.

Concerning the subject of impending changes inevitable in the telephone and telegraph situation, we are able to announce that very recent improvements in machine telegraphy by a well-known inventor who has given this branch of electrics close study for several years, greatly advance the probability of cheap and voluminous telegraph in the near future. The chief objection raised by telegraph managers against automatic working has been the special training required for operating the machines used for perforating messages on tapes. This difficulty has been entirely overcome, it is said, and messages may now be perforated by simple mechanism controlled entirely by the ordinary Morse key, so that every Morse operator in the country is at once available as a machine operator, his work being exactly as in operating a circuit in the ordinary way. Moreover, the perforating machine can be worked hundreds of miles away from the sending key, so that branch or outlying offices can perforate their messages at the distant central or relaying station with the same facility as though the key and punching machine were side by side. This will enable the accumulation by ordinary Morse transmission of business from all branch lines at central points of distribution ready for forwarding over trunk lines by the rapid-machine system.

Another important improvement comprised in this new development consists in recording the messages in regular Morse dots and dashes without the slightest "tailing" or running together of the signals, owing to static capacity of the line.

Conducting Transportation

Economic Train Dispatching

Proceedings, Pacific Coast Railway Club, Feb. 16, 1901, p. 319.

Economic train dispatching was the subject treated by Mr. George W. Turner, train dispatcher on the C. & E. I. R. R., at the regular monthly meeting of the Pacific Coast Railway Club. He said that railway managers were often in a quandary as to why their companies were gradually going down hill with no apparent reason, while other companies operating under the same conditions were forging ahead. In the premises some wiseacre finally concludes that it is due to close competition, low rates, etc. A wholesale reduction of staff is perhaps made, and yet revenues do not increase. Hence something else must be the cause of the evil, and another remedy must be found for it. Mr. Turner said that nine times out of ten the cause was due to inefficient train dispatching, and could only be remedied by thorough attention to that branch of the service. The essential element of economic and successful transportation is a thorough organization, which the speaker defined.

He also said a chief dispatcher should have but two districts to supervise successfully, and they should not exceed 100 to 125 miles in length, and might be even less if heavy business is done over them. He should not be stinted of help, and should have no clerical work to perform, since he must give the trains his whole and undivided attention. A trainmaster should never be allowed to interfere with the dispatcher's work. As a railway company is always handicapped without good power, the head of the machinery department should be allowed to rate the engines. The ratings should be in the form of a winter and summer schedule, and this subdivided into fast and dead freight tonnage. Thus will the best possible results be obtained. The dispatchers should have a fair class of operators and be allowed the use of a 31 and 19 order. All except the running orders and the restricting of the rights of a superior train should be 31 orders. The trainmen should be accustomed to receive all orders while on the trip.

Mr. Turner thinks that the block system is a serious drawback to the prompt movement of all trains, and states that the best block is a red flag, a trusty trainman and a good supply of torpedoes. Only one or two trains should have the setting of cars and do the picking up. Agents should understand that a certain train is to do this work and no others. When fast passenger trains are scheduled not to stop, they should not be stopped. [The Standard Code of the American Railway Association, in its publication of Train Rules for Single Track, gives, on pages 51 and 53, the forms of the 31 and 19 orders referred to by Mr. Turner. The latter is the longer form.—Eds. Railroad Digest.]

Improving Means of Transportation

Electrical World and Engineer, March 9, 1901, p. 309.

At a recent conference in England, Mr. C. Booth read a paper in which he maintained that the way to better existing conditions was to improve the means of communication. His remarks brought a contribution to the controversy from Mr. A. J. Balfour, First Lord of the Treasury, who agrees thoroughly with Mr. Booth, and suggests a scheme of his own for improved means of locomotion. He says that there are other means of transit besides trams, railways and tubes, and adds that he would like to have an expert exam-

ination of a system of radiating thoroughfares, confined to rapid (15 miles an hour or over) traffic, and with a surface designed, not for carts or horses, but for some form of automobile propulsion. If the local authority chose to run public autocars over them, well and good. Mr. Balfour claims that in such a thoroughfare there would be none of the monopoly inseparable from trams, the number of people carried could be much larger, the speed much greater, the power of taking them from door to door unique, while there would be none of the friction now caused when the owners of street car lines break up the public streets. He feels certain that an absolutely satisfactory autocar will soon be devised.

A Traveling Conductor

Railway and Locomotive Engineering, March, 1901, p. 115.

Street railroads know a good thing when they see it operating on the steam railroads, and one of the latest innovations on city electric lines is a traveling conductor. Mr. Frank H. Shepherd acts in that capacity on the lines of the St. Louis Electric Street Railway. He has the instruction of about 1,500 conductors in the proper method of doing their work, looking after the safety and comfort of passengers, giving information as to the best and shortest route to any and all parts of the city, mastering the intricacies of the transfer system, and, in fact, making himself useful as a storehouse of information on conductors' duties.

Traffic on the Paris Metropolitan Railway

Le Genie Civil (Paris), March 2, 1901, p. 281.

This line was opened for traffic on the 19th of July, 1900, and by the 1st of August had carried 538,403 passengers. In August 1,703,301 were carried and in December 3,447,241. These figures show not only the rapidity with which the traffic has developed but also that, contrary to what one would naturally have thought, the number of passengers has in no way diminished since the closing of the exposition, but rather continues to increase, at least on the main line. It is quite probable that the paucity of the means of transportation that made itself so severely felt during the exposition was one of the reasons for this development of the passenger traffic.

The fare charged is 5 cents for first-class and 3 cents for second-class. The statistics show that during the last three months of 1900 the traffic was at the rate of 3,365,000 passengers per kilometer (3-5 mile) of track per annum. That of the Metropolitan of London does not much exceed 3,000,000, that of the Metropolitan of Berlin is about 2,800,000 and that of the Manhattan of New York is 3,150,000.

On December 31, 1900, the rolling stock of the company consisted of 125 cars. The number of trains in service up to eight o'clock in the evening is 34, of which two are on each of the branches. The latter usually consist of 4 cars, of which only one is fitted with motors, and are capable of carrying from 160 to 200 passengers. As the trains run under a three-minute headway up to eight o'clock in the evening, the twenty per hour give a capacity of 4,000 in each direction for that time.

This capacity, which is quite sufficient during the greater part of the day, is not at all so when there comes a rush of passengers, as on Sundays and holidays, when the public, after being concentrated at one place, as in the Bois de Boulogne, wishes to be carried back to Paris. An increase of capacity is now under contemplation.

Medical and Surgical Matters

Cheshire Lines Ambulance Work

Transport (London), March 1, 1901, p. 190.

Much interest was taken in the Chesire Lines annual ambulance competition, which took place in the Liverpool Central Station waiting room on February 22d. Nine squads were present and took part in the competition. These were from Liverpool, Manchester, Warrington Station, Warrington Engineer's Department, Warrington Stores Department, Huskinson Station, Brunswick Station, Birkenhead (Shore Road), Glazebrook and Carlsbad. Dr. F. de B. Pim, of Barrowford, was the judge. The tests through which each team went were smartly performed, and afforded a fine exhibition of the skill railway servants have acquired in the important art of aiding the injured. At the close, Mr. David Meldrum, manager of the Cheshire Lines, distributed the prizes. The first prize consisted of an elaborate and costly cup, which the winners hold till other rivals wrest it from them. Each squad consists of five men, and, besides the cup, each man in the winning squad received a handsome traveling bag. Two other squads besides the first also carried off a silver cup each. Each of those who in the test won the second prize received individually, a case of carvers, and members of the third class, in addition to the squad cup, received each an umbrella. "It was pleasant," the manager said, "to find that the Cheshire Lines workmen displayed such great interest in this humane and most necessary work." He called attention to the fact that men belonging to their ambulance corps had volunteered to go to the front, and several had been accepted by the War Office. The winning team, that is, the first prize men, will, according to custom, represent the Cheshire Lines in the National Railway Competition at the Crystal Palace.

Antiseptic Mouthpiece for Telephones

Electrical Review, March 23, 1901, p. 383.

A new antiseptic mouthpiece for telephones and speaking tubes, which has been on the market a short time, has met with considerable favor. Much has been said within the last few years regarding the fact that germs of disease congregate within the transmitter of a telephone, and dangerous consequences are sometimes the result. This new mouthpiece is filled and refilled with an antiseptic solution which disinfects the mouthpiece and prevents the accumulation of bacilli. The boards of health in various cities take every precaution to guard against contagion of every description and this appliance has received the endorsement of several physicians. It is manufactured and sold by the National Electric Appliance Company, of Philadelphia, Pa.

Ozone for Treatment of Consumption

Western Electrician, March 16, 1901, p. 187.

A sanitarium is to be started in Cleveland soon, for the treatment of consumptives by an ozone process lately devised. The use of ozone for the purpose is not new, but the method to be used is somewhat different from that formerly employed. Col. W. S. Rogers, of the Brush Electric Company, who is largely interested in the project, states that the object in establishing sanitariums is to enable patients to remain in an atmosphere permeated with ozone until relief is afforded. Ozone is produced by the electrical process. The plan is to organize a parent company in Cleveland and, after demonstrating the success of the treatment in the first sanitarium there, establish others throughout the country.

A Curious Case

A curious case was decided in Ireland not very long ago. A little girl was suing a railroad company for damages, she having been born a cripple as a result of an accident her mother had met with on the train of the company before the birth of the plaintiff. The court decided very wisely that the defendant company was not aware of the plaintiff's presence on the train at the time of the accident.—Interstate Medical Journal.

The Consolidated Railway Electric Lighting and Equipment Co., of 100 Broadway, New York, has established a branch office in Chicago, Room 519, The Rookery, with its General Agent, Col. John T. Dickinson, in charge.

Miscellaneous

Busy Man's Filing System

American Engineer and Railroad Journal, March, 1901, p. 85.

Mr. R. H. Soule, Consulting Mechanical Engineer, New York, is the inventor of this system. In it three sizes of boxes are used, 7x10x2½ ins., 9½x12¾x2½ ins., and 11½x 16½x2½ ins., inside dimensions, constructed similar to the "National Receiving Case," but without plate or rod in the back of the box. These boxes are designated by the arbitrary letters P, L, and G, respectively. The file, P, is the right size for the general run of pamphlets, such as railroad club proceedings. The location of each item of information placed in these boxes is typewritten on regular library bureau cards and grouped alphabetically under separate headings in an index case, having two drawers. In looking for information, say, on boiler shops, first look for "shops" in the index, which is separated from those on other subjects by a division card called a buff third, and having the subject "shops" written in the upper left hand corner. The reference to boiler shops will be readily found, the card being in alphabetical order. The accompanying illustration shows the kind of card which will be found and the P-144 gives the file and number of the articles required. It is often necessary to cross-index an article, for instance, the subject of Electric Power Distribution at the Westinghouse Works would have one card. In that article tests of electrical and steam distribution may be given, which would need a second card. The whole secret, we are told, of keeping any filing system up-to-date, is to mark the article, with blue pencil or otherwise, and get it ready for filing when first seen, and every little while do the work of indexing and filing. The editors of the American Engineer and Railroad Journal have adopted Soule's system. The cost of the equipment is given as follows:

Boiler Shops	
Arrangement of, by F. M. Whyte	
American Engr., page 188, June 1900	P—144
Plan and sections, C&N.W. Ry.	
American Engr., page 110, April 1900	L—96

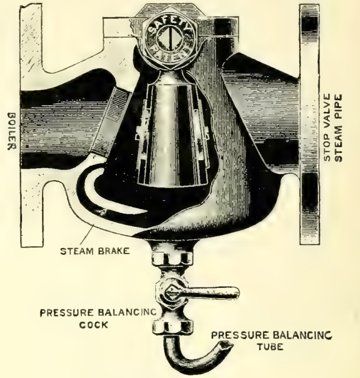
Index Card—3 x 5 ins. in Size.

1 card index, cards and case	$9.00
12 small file boxes, at 35 cents	4.20
6 medium file boxes, at 40 cents	2.40
6 large file boxes, at 50 cents	3.00
100 Manilla sheets	.50
1 plain stained book case	4.50
Total	$23.60

An Isolating Safety Valve

Modern Machinery, March, 1901, p. 107.

The accompanying illustration represents a safety valve adopted by English engineers for shutting off steam on either side automatically and instantaneously in the case of a fracture in the steam pipe, stop valve, or even in the event of a boiler explosion. In the latter case, and supposing a battery of boilers to be in use, the valve isolates the fractured one from the others. It will be observed that the device is fitted with a pendulum valve, which will swing and shut off steam and water in case of a more than usual difference of pressure on either of its sides. It thus prevents an escape and rush of steam and water taking place. A finger outside the valve casing shows always the exact position of the pendulum valve. The finger or a suitable spanner may be used to work the pendulum valve by hand. To prevent the pendulum valve swinging too hard against the seating when shutting off, due to accidental difference in pressure, steam by-passes are provided on each side of the lower part of the valve casing. Through these by-passes steam will force its way as soon as the pendulum valve is nearing the end of its travel, and thus forms a proper steam-cushion. The valve is provided with suitable packing rings, which can be replaced without difficulty. It is mounted direct onto the boiler shell, in front of the stop valve. To move the pendulum back to its central position after it has closed, due to a difference of pressure, it is necessary to equalize the pressure on each side. This is done by opening the cock of the pressure balancing tube, which will restore the balance of pressure in a very short time. The pendulum valve may then be moved back to its central position by means of the finger extending outside the main valve casing.



ISOLATING SAFETY VALVE.

Condemnation of Belleville Boiler

Mechanical Engineer (Manchester), March 16, 1901, p. 361.

This is a consideration of the interim report presented by the Water Tube Boiler Committee to the Admiralty on the use of Belleville boilers in the British Navy. The water-tube boiler, the Mechanical Engineer thinks, is in some form of other the correct thing for ships from a military point of view. The committee does not think the Belleville boiler has such advantages over other types as to lead it to recommend the Belleville as best adapted to the requirements of His Majesty's Navy. The committee, however, advises that these boilers be retained in any ships under construction where change would delay completion, but for ships ordered in the future they recommend that "Belleville boilers be not fitted in any case." The defects are said to be circulation imperfect, automatic feeding apparatus delicate and complicated; the difference of pressure between feed pipes and pumps and boiler pressure, as well as between boiler and engines, excessive; the water gauges uncertain; the upper generator tubes are liable to corrode; and the

maintenance is very costly. These, it is said, do not exhaust the list of deficiencies. In the course of investigation the committee have under observation on a small scale two other types of water-tube boilers, viz.: the Babcock and Wilcox, and the Niclausse, and recommend that further experience be gained of these, as well as of the Durr and the Yarrow large-tube boiler, with a view of aiding in the final selection of one or more of these types best suited for naval service.

Boiler Failures

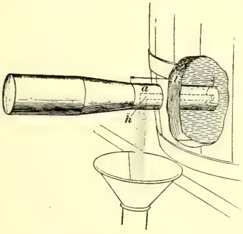
Mechanical Engineer (Manchester), March 2, 1901, p. 304.

At the annual meeting of the Engine Boiler and Employers' Liability Insurance Company, Limited, the chairman drew special attention to the report of the Select Committee on Boiler Inspection, Registration and Inspection. The committee finds that the evidence before it goes to show that some explosions occur from mistakes or incapacity on the part of the attendant, undue pressure, loss of water and other causes; and that inspection, however efficient, could not prevent such explosions. The committee considers that inspection by a competent person would tend to diminish the risk of explosion, but at the same time it holds that it is of the greatest importance to maintain the responsibility of the boiler user. The committee favors, not government inspection, but an extension of the powers of the court, so that it will have power to inflict heavy penalties on owners or users of a boiler in the event of an explosion, if it be shown to the satisfaction of the court that such owner or user failed to have his boiler inspected by a competent person at a reasonable period prior to the explosion.

A Home-Made Faucet

Science and Industry, March, 1901, p. 97.

The accompanying sketch shows a home-made faucet for oil barrels. It was designed by Mr. Arthur Neilson and can be made from a piece of broom handle or any round piece of wood of suitable size. It should preferably be turned in a lathe, but can easily be scraped to the shape shown with a piece of glass. The length *l* should be long



enough to allow it to be pulled out far enough to fill the largest size of cans used. The hole *h* is ¼-inch in diameter for ordinary oils; for heavy oils the plug should be made large enough to take a ½- or ¾-inch hole. The part *a* should be made a tight sliding fit to the hole in the barrel. The above contrivance has been of service to its designer.

[The faucet can be drawn out and pushed in, the tapered portion insuring a tight fit when not in use.—Eds. Railroad Digest.]

Mr. Carnegie's Gift to his Employees

American Machinist, March 21, 1901, p. 301.

The American Machinist believes that the recent gift of Andrew Carnegie to his employees is the most magnificent provision ever made for the old age of those whose lives are spent in unremitting toil, and who alone have made it possible for the multi-millionaires to be. Such practical appreciation of the fact on the part of Mr. Carnegie is far more useful than mere laudation with which worn-out workmen are wont to be regaled. It is to be hoped that this magnanimous act will be a shining example to others who are fortunate enough to amass large fortunes, the greater part of which they cannot use. The only reason why the general public does not consider as disgraceful the retirement of rich men who do not show an appreciation for their employees' faithful services is because such conduct is so common.

Lighting of Railway Stations

Transport (London), March 1, 1901, p. 185.

Experiments have recently been made at the General Railway Station at Perth with the Welsbach system of high pressure incandescent gas lighting. Mr. McLusky, manager of the Perth Gas Works, watched the experiment with keen interest and pronounced it an unqualified success. Formerly the consumption per burner was 3.86 cu. ft. per hour. The actual light per burner was 12.204 candles, and the average value of each 5 cu. ft. consumed was equal to 15.278 candles. From the same quantity of gas and with the same burners provided with economizers, a gain of from 15 to 20 candles was obtained, or equal to 33 1-3 per cent. increase of light. The area where the experiment was made is on the down main platform and embraces about 2,000 sq. yards. It was formerly lighted by 18 pendants with 36 burners, consuming 138.96 cu. ft., costing 5.6 pence per hour and giving a light of 432 candle power or equal to 77.14 candles per hour for a penny. Good ordinary Bray burners give a light of 125 candles for one penny, and that was given by the best one at the station tested. There are now six high pressure lanterns, each 3 feet high, fitted with three burners of the Welsbach high pressure Kern type. Each lamp consumes 26.6 cu. ft. per hour, and gives a light of 877.8 candles, costing 1.06d., or equal to 828 candles for one penny. In other words, the new lanterns give six times the light at two-thirds the cost.

The Welsbach Mantle

Electrical Review, March 9, 1901, p. 302.

Experiments made by Messrs. W. Nernst and E. Rose, and communicated to a German paper, prove that the Welsbach mantle does not increase radiation, but that a selective action takes place. It was found that the mantle behaved almost normally in the yellow and violet portion of the spectrum, but had less radiating power than a black body, to which it was equal in the yellow and violet end of the spectrum. It was further ascertained that its radiation was independent of the source of heat. It, therefore, follows that its known high economy is not due to the chemical change known as catalysis. Experiments have proved that the radiation from rare earths have been pure heat radiation. An acceptable theory of the high efficiency of this mantle may be constructed on selective radiation. The mantle radiates very little red light, and few ultra-red, or heat rays. It is therefore enabled to absorb the full heat of the gas flame and thereby to radiate a relatively large volume of light.

Baggage Defined

Railway World, March 23, 1901, p. 322.

An Ohio judge has defined the constitution of baggage, rendering a decision on the point in a recent case. He held that by baggage is meant such articles of personal necessity or convenience as are usually carried by passengers for their personal use; it does not include merchandise or other valuables designed for other purposes, such as sale or the like. He said the test seemed to be whether or not, according to the habits of persons of like condition, the particular things carried as baggage would be fit and proper for their personal use in connection with the journey. And it is clear, he said, that under no circumstances can merchandise or articles carried for business or trade, however insignificant the value thereof, be carried as baggage, properly speaking.

The Car Foremen's Association

The regular meeting of the Car Department Foremen's Association, of Cleveland, O., was held at the Kennard Hotel, Saturday, March 23, President Berg presiding.

SUBJECTS FOR DISCUSSION.

No. 1. Is the application of a 5x5 shank coupler in place of a 6x6 coupler improper repairs, the latter size being standard to the car?

After discussion it was moved that it is the sense of the meeting that an M. C. B. 5x5 shank coupler applied in place of 6x6 shank coupler should not be considered improper repairs. Motion carried.

No. 2. A car bears defect card covering spindle in place of pocket; the spindle breaks and is replaced by an intermediate road. Should a spindle or pocket be applied, and should bill be made against owners of car, or against the road which carded for the spindle?

After discussion it was the sense of the meeting that car bearing defect card covering spindle in place of pocket coupler, spindle breaks and is repaired by an intermediate road, it is proper to apply a pocket and bill on the defect card. If the road handling the car is of the opinion that the spindle impairs the strength of the car, they would be justified in treating it as if it was broken.

No. 3. A car has long continuous draft timbers, running the whole length of the car, broken on one end, and in order to remove them it is necessary to take down the transoms and cross ties. What labor charge should be made in replacing the draft timbers?

It was the sense of the meeting that a car of that kind be considered special construction, and the actual time in making the repairs should be charged.

No. 4. What labor charge would be allowed for changing Butler pocket coupler?

It was moved that the proper labor charge be five hours for changing Butler pocket coupler. A rising vote was called for on this motion, resulting in 8 members voting in favor and 2 against the motion, making it the sense of the meeting that five hours be the proper labor charge.

No. 5. A car is offered in interchange with two draft timbers, draft timber bolts and carrier iron broken, and coupler pulled out and placed inside the car. Should it be considered a combination denoting unfair usage, or owner's defect?

After some discussion it was decided that in case of the above the repairs be chargeable to owners.

The question of making suggestions in regard to changes and revisions in the M. C. B. Rules was brought up, and the advisability of having incorporated in said rules a clause permitting a charge for tightening up draft timber bolts, or any bolts and nuts that were loose, was discussed. It was suggested that if the rules would allow a charge of that kind, this feature would be more carefully looked after.

Several of the members stated that it had been their practice to charge for tightening up bolts as far back as they could remember.

President Berg: It appears that a majority of the members present have been doing this work, and considered it chargeable to owners, while others have not. In view of the fact that some of us have not, I think it would be a very good idea to have it incorporated in the rules, then we would all do it, and it would have a tendency to keep car equipment in better shape.

A motion to make it the sense of the meeting that the M. C. B. Rules should provide a labor charge for tightening up loose bolts and nuts was carried.

There being no more business the meeting adjourned.

CHICAGO.

The regular meeting of the Car Foremen's Association of Chicago will be held in Room 209, Masonic Temple, Chicago, Wednesday evening, April 10, at 8 o'clock P. M.

The following programme has been arranged:

1. What is the proper method of procedure, both as to repairs and bill, in the following case:—A car owner finds one of its 60,000 lb. cars with a wrong pocket and wrong draft spring; the car bearing a repair card reading: "One Gould Coupler, broken." Owners procure a joint evidence card reading: "One wrong draw bar pocket ¾x4x10, should be 1x4x10¾, one 7-in. draw bar spring should be 8 inch." Wrong attachments were on the coupler covered by the repair card.

2. In case of a new Janney coupler complete is applied to a foreign car account Janney head broken, knuckle and pin lost, what is proper charge against owners?

3. In making bills for repairs to foreign cars should malleable iron brake heads for metal beams be considered under the heading of manufactured articles, or should they be charged at the regular price of 3c. per lb. for malleable iron per M. C. B. Rules?

4. When billing for destroyed bodies of twin hopper bottom gondola cars, should bill be governed by the prices set forth in Section 25 of M. C. B. Rule 5, or can body be considered as that of a car designed for special purposes and bill rendered at present cost price, per Section 27 of M. C. B. Rule 5?

5. Report of Committee on Loose Draft Rigging and Neglected Bodies of Cars.

6. Mr. J. C. Grieg will present a paper on "Passing cars at terminals with defects for which defect cards are requested and subsequently obtained."

The Air-Brake Association

The Eighth Annual Convention of the Air-Brake Association will be held in Chicago, Ill., beginning April 30th, and continuing for three days or more.

Convention headquarters will be at the Leland Hotel, on the corner of Michigan avenue and Jackson Boulevard.

Members are urged to stay at the headquarters' hotel, which is centrally located, within two blocks of all the elevated roads and easy walking distance of the shopping district, Public Library and the Art Institute. The meetings will be held in the hotel clubroom. Adjoining the convention hall will be two large rooms for supply men's wares and up-to-date air-brake kinks which members may desire to bring with them to the convention.

Arrangements have been made with the Pullman Company whereby special half-rates will be granted to members and their immediate families.

Any further information regarding the convention may be had by members by writing the Committee on Arrangements, which is as follows: E. W. Pratt, Chairman; C. B. Conger and S. J. Kidder.

Graphophone for the Shah

Never has so original and elaborate a gift been made by a subject to his sovereign as the one recently ordered, in Washington, from the Columbia Phonograph Co., by the Persian Minister, for presentation to the Shah of Persia.

This magnificent gift was shipped from the factory of the American Graphophone Co., at Bridgeport, Conn. It consists of a multiplex Graphophone Grand and thirty-four barrels of records and blank cylinders.

One of the interesting features of this shipment is that it will complete the last stage of its journey—from Batum to Teheren—on the backs of camels, and it goes without saying that no present that has ever been received at the palace of the Shah created even a small fraction of the interest that will be awakened when this phenomenal instrument, from far away Connecticut, makes its appearance and lifts up its wondrous voice.

Pneumatic Tools

We have received a copy of special edition catalogue No. 12, issued by the Pneumatic Tool Company of Chicago. The catalogue is a series of half tones showing the Boyer long stroke hammer and holder-on, the pneumatic drill and a 9-foot chip cut from a corrugated furnace in one hour and twenty minutes. The sculptor's art is also ministered to by the Boyer hammers, one cut showing the Palmer Memorial Fountain at Detroit being carved with Boyer stone hammers. Boyer riveters are shown in use in structural bridge work. In short, hammers, drills, riveters and all the variety of tools made by this company are shown at work in the many and various uses of which they are capable. The company's New York office is at 95 Liberty street.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

M. C. & L. P. A. Portrait Gallery

Mr. Duncan W. Smith, whose portrait appears herewith, and who has been recently promoted from the Wellsville shop of the Pennsylvania lines west of Pittsburg, Northwest system (Cleveland & Pittsburg R. R.) to take charge of the painting at the Allegheny shops of the same system (P., H. W. & C. Ry.), succeeding the venerable John Josenhans, was born at Wellsville, Ohio, October 8, 1854, and is, therefore, in his forty-seventh year. He entered the service of the Cleveland & Pittsburg Railroad shops at Wellsville, May 1, 1871, which became a part of the Pennsylvania lines a short time after he started to work. He was first employed to run a drill press in the car shop. On October 1, 1871, he entered the paint shop to learn the trade, working at painting until January 1, 1883, when he was appointed foreman, which position he held until he was transferred to the Allegheny shops, January 1, 1901.

This move, from the Wellsville to the larger shop, at Allegheny, together with his long service at the former place, is a high compliment to friend Smith as a man and a painter, and, no doubt, a deserved one; and his friends will wish him all success.

He joined the association at the meeting at Chicago in 1886, and has been a constant attendant at our conventions.

DUNCAN W. SMITH.

The Next Place of Meeting

There is general dissatisfaction, especially in New York and New England, with the action of the Advisory Committee in changing the place of the next convention from Buffalo to New York City. It looks as though we were "Buffaloed." From a private letter, written by a well-known New York member, we make the following extract:

"Who is this Advisory Committee, and where does it get authority to change our voted place of meeting? It strikes me the crowd from the Middle West are 'treking' over Eastern 'kopjes' with impunity. In the vernacular of New York, 'What is their number, and where do they get off?' "

Another unsolicited communication comes in for publication, as follows:

"Editor Railroad Paint Shop:

"The action of the advisory committee, designating New York for our next place of meeting, is questionable. See Section III., Article XIII. of the constitution.

"The next choice to Buffalo at our last convention was Toronto; there was not a vote for New York. Therefore, the wishes of the members should be respected, or at least consulted. I have consulted several members, all of whom take exception to New York, and favor the second choice, Toronto.

A. L. PAYNE,

Metropolitan Street Railway Co., N. Y."

The following is from the veteran organizer of the M. C. & L. A., and its second president:

"Mr. Editor:—I see by the last number of the "Digest" that some twenty members of the Car Painters' Association give out notice that our next meeting will be held in New York City.

"At Detroit, the majority of members present said, 'Put me off at Buffalo.' I opposed Buffalo by vote and otherwise, but submitted with as good grace as possible, after having been beaten. And now I rather like the choice, and looked forward to the time with much pleasure. I am still of the opinion that the majority should rule in this, as well as all other matters and I, for one, don't like to submit without some further action by a majority of the members in good standing.

"I think a matter of this importance should be submitted to a vote of members by postal card, issued by the president or secretary, by his authority. There is plenty of time, and I think this, or some other feasible plan, should be adopted in order to be satisfactory to a majority of the members.

"WARNER BAILEY,

"Concord, N. H."

Editor Paint Shop:

At a meeting of the committee on uniform stenciling of freight cars, held in Buffalo yesterday, the question of change in place of meeting of our next annual convention from Buffalo to New York was talked over, and it was the opinion of all present that the advisory committee in asking the action it did, had exceeded its authority, and that it should be the duty of our president, Mr. Brunning, to so declare. Our constitution makes no provision for change of meeting place for our annual convention, therefore, nobody is clothed with authority to do so. New York would be as acceptable to me personally as Buffalo. My reason for favoring Buffalo, when the ballot was taken in Detroit, at our last annual meeting, was because I believed then, as I do now, that it was doing the right thing to give all members an equal chance to see the great Pan-American Exposition. We may not be as well provided for in hotel accommodations at Buffalo as we would be in New York, but I am satisfied that all will be made very comfortable if we go to Buffalo. I see no good reason for making the change and believe it would be a violation of the constitution to do so. No objection has been offered against Buffalo, which was not offered at Detroit, and voted down by a large majority; therefore, let us go to Buffalo, determined to attend the sessions of the association, see the big show, and be happy.

H. M. BUTTS.

Since the above was written I have received copy of circular, issued by the President and Secretary, calling for a mail ballot, as follows:

Dear Sir and Associate:

Having read the adverse criticism on the action taken by the Advisory Committee in changing the place of our next Annual Convention from Buffalo to New York, and not wishing to get up any friction among our members, but wishing to serve them as a whole (notwithstanding that I am satisfied that the change was for our best interests) I deem it my duty to get an expression of all members in good standing and to let the majority rule. I, therefore, call for a vote by mail from each member stating whether for or against the change.

Please forward, at once, your vote to Robert McKeon, Secretary, Kent, Ohio, and he will announce the result in the Railroad Digest.

Fraternally yours,

A. J. BRUNING, President.

Attest: Robert McKeon, Secretary.

OBITUARY

Editor Railroad Paint Shop:

It becomes my painful duty to announce the death of our esteemed friend and associate, Mr. Thomas McWhir Dunlap, late master car painter at Glenwood shops on the Pittsburg division of the Baltimore & Ohio Railroad.

Mr. Dunlap died of Bright's disease on February 7, after a week's illness, aged forty-five years. Deceased was born in Paisley, Scotland, and, when a boy, came to America with his parents, who survive him in a good, hale and hearty old age. At the age of sixteen Mr. Dunlap began to serve his apprenticeship at car and locomotive painting at the Grafton, W. Va., shops

T. M. DUNLAP.

of the Baltimore & Ohio Railroad Company, then under the foremanship of our late associate, A. J. Moriarty (a brother-in-law of the deceased). After serving his time out at Grafton shops, Mr. Dunlap was transferred to the Connellsville shop on the Pittsburg division, where he worked as a journeyman and assistant foreman under the foremanship of Mr. Herbert Purdy.

In 1884, Mr. Dunlap was appointed foreman of the Glenwood shops, which position he continued to successfully fill until he was called upon to walk through the valley of the Shadow of Death.

Mr. Dunlap was a genial, companionable man, ever faithful to those who enjoyed his friendship. He became a member of our Association at the convention held in Washington, D. C., September 9, 1891, and during the time he was permitted to remain in active membership, was a most painstaking, earnest worker in its interests. He was a member of the Washington lodge, No. 253, F. & A. M., of this city; of Fayette lodge, I. O. O. F., and of Knights of Pythias, of Connellsville.

Mr. Dunlap is survived by a wife and six children, the youngest of whom is nine years old, by an aged father and mother, sisters and brother, with whom we sympathize in this, their sad hour of trouble.

Deceased was buried by the Masonic fraternity from the Episcopal church of Connellsville, Sunday, February 10, 1901.

W. O. QUEST,
P. & L. E. R. R. Shops,
McKees Rocks, Pa.

Railroad Car Sanitation

Extracts from the proceedings of the St. Louis Railway Club, February 8, 1901:

Question No. 35.—"At a recent discussion at the Western Railway Club on compressed air used for cleaning purposes, a thorough and complete dusting of cars was advocated. Is this not contrary to sanitary science, as so well set forth in Prof. Johnson's very excellent paper on the above subject printed in the St. Louis Railway Club Proceedings, for February, 1899?"

Answer.—The cleaning of cars by removing the dust from the same by any means whatsoever, would not be contrary to the principles stated in my paper printed in the Proceedings, for February, 1899. While the operation of removing the dust by means of compressed air, or in any other way, might carry contagion to the persons performing such service, it would be eminently wholesome and beneficial to the traveling public. To insure immunity also to the cleaners, it would be necessary to remove the dust without throwing it into the air. This would be done by washing, or wiping with a damp cloth, so far as the woodwork is concerned. The cushions, should, of course, be dusted out of doors, or with all the windows in the car open.

The matter of prevention of contagion through dust comes simply to this: Avoid the accumulation of dust as much as possible by eliminating, so far as possible, all out-of-the-way places for its deposition; cleanse all floors by scrubbing; stop, if possible, and at every hazard, all expectoration upon the floors of cars, and railway stations. Where spittoons are used, they should be supplied with water and cleansed daily, and under all circumstances keep the cars and railway stations cleaned as perfectly and as often as possible, whether by dry or wet processes.

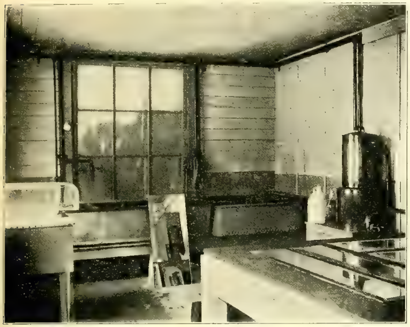
J. B. JOHNSON,
Dean University of Wisconsin.

In reference to the answer from Prof. Johnson, Mr. J. A. Gohen will address the club on the subject of cleaning cars by compressed air.

Mr. J. A. Gohen (M. C. P. Big Four Ry.): Gentlemen, I am afraid the President goes a little bit too far in saying that I will address the club on this subject, but I have a few words to say. It is in relation to Question No. 35.

Prof. Johnson has answered that, but only partly. He says in his answer, "While the operation of removing dust by means of compressed air, or in any other way, may carry contagion to the person performing such service, it would be eminently wholesome and beneficial to the traveling public." Well, that is all right so far as it goes, but why should not Prof. Johnson go further and say that he would guarantee immunity to the man who cleans the car just as well? That man's life is just as precious and just as valuable to his family as any of the traveling public. The millionaire should be as good as the pauper in this case. Now, I wish to say that we are cleaning cars with air, and we are granting immunity to our men who clean them, from infection by this dust. It is a very simple operation, and I cannot explain its details to the club just now, but we have at our Shelby street shops in Indianapolis, where we clean a great many cars by air, and also in Cincinnati, an attachment put upon the end of this air-blowing machine, which carries all the dust that accumulates through the blowing out of the car, outside of the car into the air, through the means of a piece of hose—engine tank hose, I guess. It is about the size of engine tank hose. That is attached to our blower in such a way as to carry all the dust and everything out into the air, so that the classes who in reality should be guaranteed from immunity are those people on the outside. I presume if it would be beneficial to the members of the St. Louis Railway Club and to the railroads in general, if they have nothing of the kind, I might get a blue print made of the little attachment; there is no patent on it. We at one time did have a bag attached to this air blowing machine that would concentrate all the dust and dirt into that bag, and that would keep it out; but we found that one of our men had applied for a patent on that and he shut us off of it, so we went to the other extremity and got the hose. It is a very effectual affair, simple and crude, but it does the work, and the man doing the blowing out of the cars is guaranteed from infection in the way of any contagion contained in the dust accumulating in the car. I want to say that Prof. Johnson is perfectly right so far as he goes, but he doesn't go far enough. He may have said: "We may grant immunity to the man who cleans the cars also." That is all I wish to say about it.

The President of our Association, in a telegraphic message, requests me to announce that members in voting for next place of meeting, by the letter ballot, may of course vote for Toronto or any other place.



Glass Embossing and Silvering

Herewith are presented interior views of the glass embossing and silvering room at the Wabash R. R. car shops, Decatur, Ill.

In sending the photos, Mr. W. R. MacMasters, the foreman painter, writes as follows:

"We are very busy in our shops, working them to their full capacity in order to get our passenger equipment through before the opening of the Pan-American Exposition.

"I inclose pictures of our glass room which may be of some interest to some of your readers. No. 1 shows the west end, with its lye and water tanks and washing racks. These are fitted up with cold and hot water. The zinc-covered polishing table is on the left; on the right is shown the still, with which we make our distilled water. No. 2 picture (looking east) shows the steam table for silvering. Just behind it is the dark, or flowing, room, which is fitted up with racks for the glass to lie on. In this room all the glass to be embossed is flowed. We are using the Winchell printing solutions with excellent results. The dark room is entered by a door in the hallway at the right side. The door at end of the hall, to the right, opens into the acid room, which is fitted up with acid tanks with hooded ventilators over each to carry off the fumes. We have not very much room, but our master car builder, Mr. Needham, has fixed it up so conveniently for us that we are able to turn out a large amount of work in this line, as we do all of our own silvering and embossing."

For some time the Boston & Maine R. R., at its Lowerville and Salem shops, has done all of its silvering and glass embossing. No mirrors, or etched and embossed glass are now purchased. It is found to be very handy and economical. No fretting or worrying has to be done over the arrival of some expected glass ordered for a specific object. The Paint Department people have it in their own hands and know just when they can have work completed and ready for use. No railroad of any magnitude should be without a plant of this sort, which is inexpensive to fit up. Some of Winchell's printing solution is also ordered for trial by this road.

Protective Coatings for Iron Parts of Refrigerator Cars

We make the following further extract from the proceedings of the St. Louis Railway Club in addition to that of Mr. Gohen on this subject last month:

To say what is the best coating to prevent the effect of salt water on iron of refrigerator cars is a difficult problem to solve, owing to the numerous conditions this iron is subject to. There are carbon and graphite paints which have produced good results, providing they were properly applied. The conditions under which the material is applied are just as important as the paint itself. If the metal is rusty or corroded, and not cleaned before painting, it makes little difference how good the quality of the paint may be, it will flake off. Rust, once started, is difficult to stop; it is easier to prevent it from starting. To this end I would advise the application of a primer right at the manufacturers. While it may add a trifle to the first cost, it would prevent the starting of the rust. Then, when the material is used in construction, it could be covered with a paint found to be the best under the conditions it is subjected to. Paints used for this purpose must not have chemicals containing destructive properties to the oils or japan used; it must adhere firmly to the surface to which it is applied and must not chip or powder off. Great care, however, must be exercised that the surfaces are properly cleaned and prepared for the application. While I realize the importance of the protection of iron work, I must say that we use no salt for cooling purposes, and have had little trouble in this line, therefore I have given the subject but little attention.

However, we are now using asphaltum gloss black of a good grade, and paint after, which I think should also be done with any other material.

A. G. STEINBRENNER,
M. C. B., A. R. T. Co.

NOTES AND COMMENTS

Mr. Frank Taylor has resigned his position as master painter with the Barney & Smith Car Co., of Dayton, Ohio, to take effect upon the appointment of his successor. On Thursday evening, March 28, all of the foremen and assistant foremen, clerks and officers, gave him a "send-off" at the Hotel Algonquin, of Dayton. This speaks well for the social qualities of the concern. Mrs. Taylor's impaired health has made a change of climate imperative at once, though it has been contemplated for some time, as she was critically ill recently. They are to come East, where Mr. Taylor has some business affairs that require his attention.

W. E. Hibbard, of the B. & A. shops, Allston, is varnishing 15 cars per month of the New York Central's equipment, the lessee of the B. & A. The latter's cars are painted to New York Central standard, when they need painting; otherwise they are cleaned and varnished as they are. But when painted, they are lettered "Boston & Albany," as before, except that the N. Y. C. style of Roman letter is used and the word "and" substituted for the character "&" in use by the B. & A. previously. If we were to criticise, we should say it is time to quit this "A-N-D" business, instead of beginning its use, especially with such long names as the "New York Central AND Hudson River."

The Boston AND Albany has gone through this struggle of parting with the word and substituting the character, the most of its cars being now marked that way and the rest will be probably so changed during another year. Four large gold letters per car are worth saving in an equipment of 1,500 cars.

Mr. J. T. Chamberlain, M. C. B., Boston & Main, has removed from the little, old, poorly-lighted office on the second floor of the Union Station, Boston, to large, commodious, well-lighted rooms on the fourth floor, where his whole clerical force is collected, instead of a portion being in another wing of the building as formerly.

Business is rushing at the Union Pacific shops, Omaha, according to a Boston paper, of March 30. As a result of its cut in rates and the tide of travel westward, the paper says: "The great shops at Omaha are being run night and day, placing hitherto discarded cars in condition to travel. So great is the demand for workingmen at the shops that even men laid off for economy's sake a year or two ago, because they had reached an age at which they could not render full value, have been taken back, temporarily, at least."

Our readers, Association members especially, will be pained to learn of the death of Mr. Thomas Dunlap, foreman painter at the Glenwood shops of the Baltimore & Ohio, Pittsburg, Pa., which occurred, of Bright's disease, at 5 p. m. Thursday, March 7. He was 45 years of age. Burial was the following Sunday at his old home, at Connellsville. He had been in ill health for some time, but of late he seemed to think he was getting better and was making calculations to rejoin us as he, through no fault of his, had not met with us in convention for some years. Many will remember him as a ruddy, round-favored, thick-set man, the picture of health when he last met with us. "Tom," as he was familiarly called, was a genial, companionable soul. We called at his shop a few years ago, while at Pittsburg exploiting air painting, and enjoyed his courtesy in many ways. So "our boys" go, one by one to "that bourne from which no traveler returns." Let us act well our part while we stay.

Mr. D. W. Smith, heretofore foreman painter at the Cleveland & Pittsburg shops, Wellsville, Ohio, succeeds Mr. John Josenhans, retired, in the same capacity at the P., F. W. & C. shops, at Allegheny, Pa. His portrait and biographical sketch appears elsewhere in this issue.

Mr. W. J. Josenhans, heretofore assistant foreman painter at the P., F. W. & C. shops, Allegheny, Pa., has severed his connection therewith and gone into the hotel business at Kittanning, Pa., under the name of "Hotel Alexander," Josenhans & Knorr, proprietors.

In consequence of an entire change of management of the Seaboard Air Line, Mr. Robert W. Scott has severed his connection with that company as master painter.

Mr. E. A. Cole has severed his connection with the J. G. Brill Car Company, Philadelphia, Pa., and, we understand, is keeping a hotel in the same city, and, presumably, is succeeded by Mr. Charles Blair, his assistant. Latest advices would seem to indicate that it's but a step from a foreman of a paint shop to the landlord of a hotel.

It has been represented to me that our lately deceased member, Mr. C. A. Bruyere, of the Canada Atlantic, left a widow, three children and an aged mother in quite dependent circumstances. He could not join an insurance society on account of poor health. Unfortunately, for such cases, our association is not a benefit order, still, of course, individual members and others, blessed with this world's goods, may contribute privately if they so desire. Address, Mrs. C. A. Bruyere, 17 Osgood street, Ottawa, Ont.

On cars painted Pullman, or other dark body colors, the blacking of crown moldings on body and deck is a waste of time and material. Paint them right over the body color and make the roof color come right down to meet it unseparated with black. The Boston & Maine issued an order to all shops to this effect some time ago, not only in this regard but abandoning all black trimming of body whatsoever, even to the chafe-irons on the sides of baggage car doors, which are also painted Pullman color. This may disturb one's fancy at first, but one so soon becomes accustomed to it and wonders why it was ever done otherwise; and so a good deal of time and material is saved; and "time is money," to say nothing about the material. The fact is that the contrast between the Pullman color and black is not sufficient to warrant this outlay.

It is painful to receive the news of the death of a friend in ordinary ways, but when it is first learned by routine in an annual report in a club, it is startling and a fresh illustration of the shortness of life.

Such was my experience at the N. E. R. R. Club last night, March 12, when the secretary read his annual report and gave the names of seven members who had died during the year, the last of whom was D. Frank Price, for many years representing Moses Bigelow & Co., but recently vice-president of the Palmer-Price Co., Newark, N. J. "Frank" was a genial fellow and will be missed by a host of friends.

An accident at the new southern terminal Boston recently, wherein a smoking car was backed through the fence which separates the trains from the general public, taking the train bunter and fence with it, recalls an incident which is said to have occurred on a train coming to Boston. "Does this train stop at Boston?" inquired an old lady of the conductor, and the latter, having the train bunter in mind, no doubt, replied, "Well, if it doesn't, my good woman, there'll be the blamedest jolt you ever felt."

The rumor reaches us that our old associate, Mr. R. W. Scott, late master painter of the Seaboard Air Line, at Portsmouth, Va., has connected himself with N. Z. Graves & Co., paints, varnishes, etc., Philadelphia, Pa., in the railroad trade. "Bob," as he is familiarly known to us all, ought to do well in this line, if this rumor is correct.

The N. Y., N. H. & H., according to a Boston paper, have contracted for 47 passenger coaches to be built this season, about evenly divided between the Pullman Company and the Osgood Bradley Car Company, of Worcester, Mass. Those to be built at Pullman are to be vestibuled for through service; those at Bradley's, without vestibules.

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

Hopper-Bottom Car

No. 670,614.

GEORGE I. KING and BURCHARD H. JESSEN, of Detroit, Mich., assignors to the American Car & Foundry Company.

The invention consists, generally

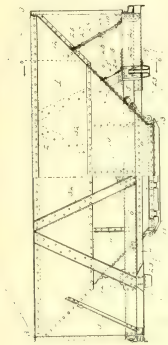


FIG.1.

stated, in making the side walls of the car of sheets or plates of metal in the form of plate-girders, which in addition to carrying their proportion of the load also serve as the containing side walls of the car and form members of a trussed structure, in connection with other members of the side framing. To resist the shearing forces at the ends of the plate-girders, we provide inclined stiffening-braces in the form of channels which slope downwardly and outwardly toward the point of support—to wit, the body-bolsters of the car—said stiffening-braces being tied together by floor-beams, which latter afford means of attachment of the floor-supports. These stiffening-braces serve as the end posts for the trussed structure and as the main supports for the superstructure above the bolster. The side sheets of the car (shown in the accompanying drawings) do not extend down to the side sills, the sloping side floor-sheets and their attached parts serving as tension-flanges for the plate-girders, said sloping side sheets also co-operating with lattice-girders, as will hereinafter be described.

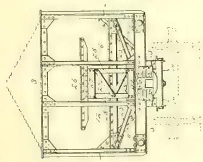


FIG.3

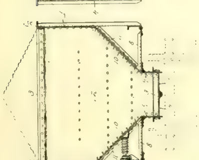
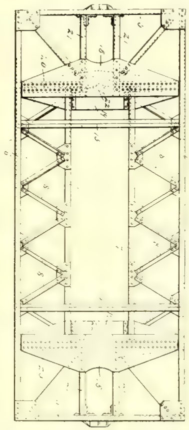


FIG.4.

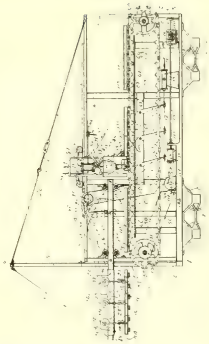


Railway-Track Making and Laying Machine

No. 669,777.

ALBERT BEEBE, of Denver, Colo.

In a track-laying machine the combination with the car, the framework on said car and the power-driving engines and driving-shaft, of a shaft arranged to be driven from said driving-shaft, means for starting or stopping, and for reversing the rotative direction of said shaft, the rail-bending mechanism operatively connected and driven by said shaft and arranged to bend two rails at a time, an endless conveyer-chain operatively mounted to be intermittently rotated a predetermined



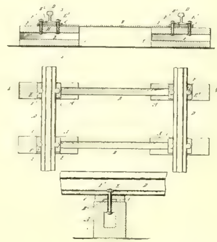
distance from said power-engines and driving-shaft and arranged and adapted to support and convey in operative relation both rails and cross-ties of a section of railroad-track, a power trip-hammer, spike-driving mechanism arranged over each rail, a suitable guide for positioning said rails to the desired gage of track, and for guiding said rails under said trip-hammer, means including tongs for holding spikes in proper position to be driven into said cross-ties to secure them to said rails, and means including said power-engines and driving-shaft for lowering the completed spiked rails and ties from the car to a road-bed.

Railroad-Tie

No. 669,559.

HIRAM STOUT, of Kingman, Kan.

A railroad-tie, comprising a pair of hollow stringer-blocks of vitreous material, a tie-bar bolted to said blocks,



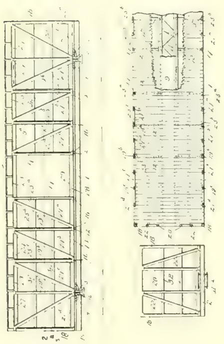
wooden chairs for receiving the rails, interposed between the blocks and rails, and having recesses at their under sides for receiving the ends of the tie-bar, as set forth, and bolts for connecting the parts with each other, the nuts of the bolts engaging the rail-bases.

Box-Car

No. 669,797.

GEORGE I. KING, of Detroit, Michigan, assignor to the American Car & Foundry Company, of St. Louis, Mo.

A box-car the combination with the body-bolsters, of trussed side frames supported by the ends of the bolsters, said frames being arranged to carry their proportion of the load without the assistance of longitudinal truss-rods or other supports intermediate the bolsters, said frames consisting of top and bottom metallic chords, the former being placed in compression and the latter being attached to the bolsters and placed in tension, post and diagonal pockets immovably attached to said metallic chords, wooden posts and diagonals fitting in said pockets, which posts and diagonals are subjected to compressive stresses only, metallic suspending-rods in juxtaposition to said posts and co-operating with the metallic chords, said suspending-rods being subjected to



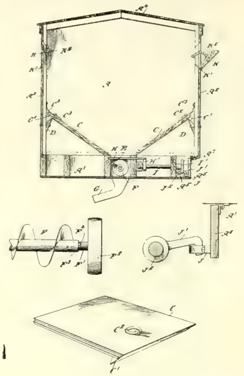
tensile stresses only, and floor-beams attached to and supported by the center sill and bottom chords of the trussed side frames, said floor-beams being arranged in the transverse planes of the suspending-rods and serving to tie the bottom chord members in position intermediate the bolsters, carlines attached to and supported by the top chords of the trussed side frames for tying the upper portions of said side frames in position.

Convertible Freight-Car

No. 669,876.

OSCAR BENJAMIN CRITCHLOW, of Leadville, Col.

A freight-car having a box-body with movable inclined floor-sections, a conveyer-casing in the bottom of the car and into which discharged said floor-sections, a conveyer-screw in said conveyer-casing, a discharge leading from said casing, slides for closing said



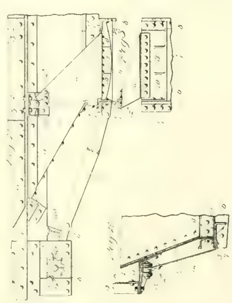
casing at the top thereof, means for moving the slides, the said means extending within a chamber on the car-body, a hinged door for said chamber provided on the inner side with keepers and a shaft extending longitudinally in the chamber and mounted to turn, the said shaft being provided with catches adapted to engage the keepers on the door.

Door for Hopper-Bottom Cars

No. 670,615.

GEORGE I. KING, of Detroit, Mich., assignor to the American Car & Foundry Company, of St. Louis, Mo.

The mechanism operating the door preferably consists of a link 15, pivotally connected to lug-castings mounted on the angle 9, said link being pivotally mounted on a rock-arm 16, extending from the inner end of a shaft 17. This shaft carries a ratchet-wheel 18 on its outer end, with which co-operate pawls 19. A stop 20, preferably secured to the center sills of the car, arrests the rock-arm in its inward movement when the pivotal points of the



link are past a line of dead-center, which construction serves to lock the door in its closed position, the ratchet-pawls serving to prevent the rock-arm from being dislodged.

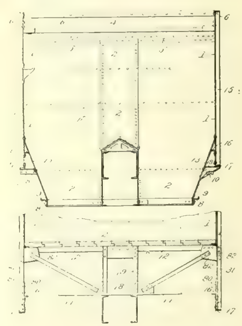
When it is designed to open the door, the pawls are disengaged from the ratchet and the rock-arm turned down, which, through the link connections of the door, causes the door to swing downwardly and outwardly.

Hopper-Bottom Car

No. 669,798.

GEORGE I. KING, of Detroit, Mich., assignor to the American Car and Foundry Company, of St. Louis, Mo.

In a hopper-bottom car, the combination with the side sheets which are sheared or cut off at an angle along their lower edges, said hopper-sheets forming continuations of the side sheets, and inclined floor-sheets formed with downturned flanges along their sides which extend to the lower edges of the side and hopper sheets, and se-



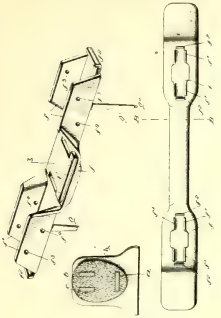
curing devices which pass through said flanges and said side and hopper sheets.

Composite Railway-Tie

No. 670,495.

CHARLES C. HARRELL, of Bainbridge, Ga.

The invention consists in a composite railway-tie of such construction as to avoid the necessity of all nuts, which, as is well known, are impossible to be kept from shaking loose, one in which the rails are secured to their chairs or supports by a resilient fastening which is very easily removed when necessary and in which the fastening is so simple that the rail can be easily released from the tie and the cushion of compressed fiber or similar substance be readily replaced or renewed. It is also manifest that the tie and its plastic housing are so pro-



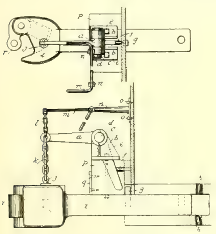
portioned as to cause the greatest weight to be borne by the parts which are made the strongest, so as to best support the loads which they must bear.

Car-Coupling

No. 670,055.

FRANK R. MOORE, of Cuyahoga Falls, and EDWARD M'SWEENEY and CHARLES SCHLEY, of Akron, Ohio.

The objects of our invention are to prevent the draw-head from being pulled out and falling on the track if



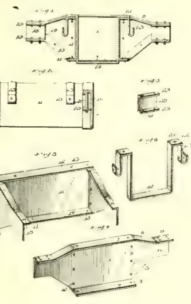
it shall be detached or broken from sudden shock incident to starting or stopping the train or other cause and to cause the breaking of the draw-head attachment to uncouple the car where the break occurs, so that when air-brakes are used the car and the portion of the train back of it will be brought to a stop and the engineer notified; and a further object is to provide simple devices to secure the foregoing ends that may be with slight attachments readily secured to the couplers now in use.

Pressed-Steel Car-Truck

No. 670,218.

ALEX. ZENOWSKE, of Allegheny, Pa.

In a car-truck frame, the side frame members or beams having ends of less



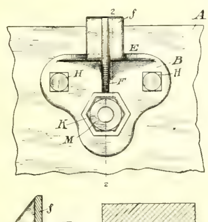
width than the body of the beam and provided with inwardly-extending flanges, angle-iron strengthening-bars of substantially "L" shape secured to the beams at their ends, transoms of channel-bar form connecting the beams together, flanged strengthening-plates secured to the inner face of the beams at each end thereof, and channel-bars secured to the flanges of the strengthening-plates.

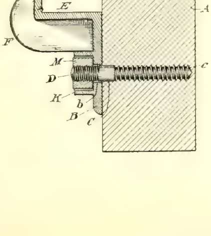
Guiding-Bracket for Car-Doors

No. 670,143.

HENRY C. WILLIAMSON, HERMAN PRIES AND JOHN W. MEYER, of Michigan City, Ind.

In combination, a car-door-guiding bracket, having an aperture surrounded by a polygonal flange and a sole-plate, the ends of which are more remote from such aperture than its intermediate portions, a stud adapted to project from a car-body and having its outer end threaded, a nut fitted within the polygonal flange, for engaging the stud in non-rotative relation with the bracket and in register with its aperture.



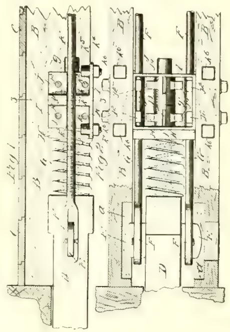


Draft-Rigging

No. 669,843.

GEORGE S. MARSHALL, of St. Louis, Mo., assignor to Western Railway Equipment Company.

The combination of draft-sills, a coupler-shank located between the same, a casting in rear of the shank, a cross-key passing through said coupler-shank and the ends thereof working in longitudinal recesses in the



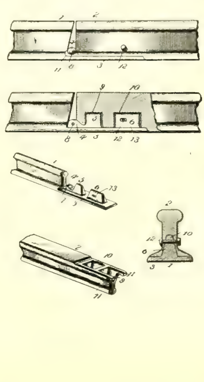
draft-sills, draft-rods secured to said cross-key and located between the coupler-shank and the draft-sills, a tail-bolt for said shank, said tail-bolt and draft-rods passing through channels in said casting.

Rail-Joint

No. 670,115.

A. I. STEPHENS AND B. F. STEVENS, Reeves, Tex.

In a rail-joint, a basal extension projected from the end of the rail provided upon its top side with a series of projections, the innermost projection being adjacent to the extremity of the rail bordering upon the basal extension, a matching end of the adjacent rail having its bottom side cut away to receive the basal extension and provid-



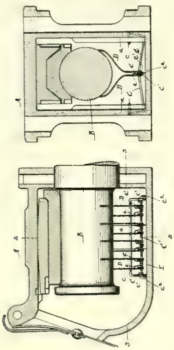
ed with sockets to receive the aforesaid projections, hooks extended from the recessed rail end and adapted to embrace the innermost projection of the basal extension, and a fastening overlapping said hooks and passed through an opening of the projection spanned thereby.

Lubricator

No. 667,183.

GEORGE J. BINGHAM, of Chicago, Ill.

A lubricator for journals comprising individual wires of copper or like suitable soft metal having their free ends



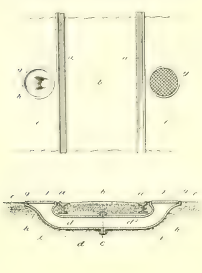
arranged to bear against the journals to be lubricated, and adapted to receive oil from the reservoir, and springs engaging said individual wires at points below the upper surface of the oil within the reservoir, said springs serving to force the free ends of the wires into light bearing with the journals.

Hose-Conduit for Railways

No. 669,214.

HENRY GEISE, of Philadelphia, Pa.

A fire-hose conduit for railway-tracks comprising a tubular pipe, d, constructed in two sections and bolted together at their meeting edges, upwardly-curved ends, i, provided in said pipe, and an enlarged flaring mouth for each outlet having the curved walls, h, for deflecting and guiding the hose during its insertion.

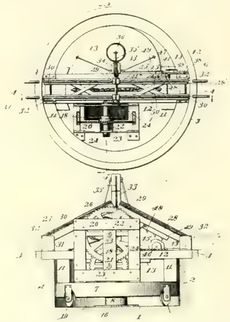


Locomotive Turn-Table

No. 669,844.

THOMAS F. MASON, of Varner, Mo.

In a turn-table, the combination of a base, a rack thereon, a shaft upon



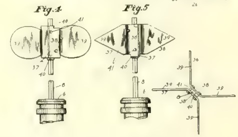
the turn-table carrying a gear meshing with the rack, a train of gears for operating said shaft, depressible rail-sections for imparting motion to said train of gears, automatic means for locking and releasing the turn-table, and retracting means for restoring the turn-table and parts to their normal positions.

Railroad-Switch

No. 669,695.

JOSEPH J. HERLBAUER, AND ERNST G. TEICHART, of Buenavista, Pa.

In a switch-stand, the combination with a switch-rod, of the crank-shaft to which said rod is connected journal-



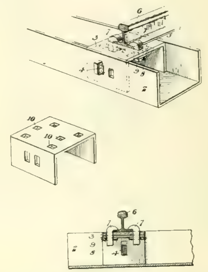
ed in the base of the stand, the operating-lever pivoted to the side of the stand, the reciprocating rod connected at its lower end to the crank-shaft, the yoke connecting the operating-lever with the upper end of the reciprocating rod, the rotating block in the upper end of the stand, said block having a spiral groove, and a stud on the reciprocating rod and engaging the spiral groove in the block.

Metallic Railway Tie and Chair

No. 670,754.

REUBEN R. ALLSHOUSE, of Allegheny, Pa.

The combination with a tie consisting of a channel with its flanges projecting upwardly, of a chair consisting of a channel-section having its flanges projecting downwardly, and fitting against the inner faces of the channel-flanges, the top of the chair



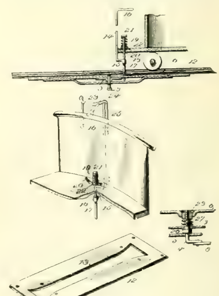
being flush with the edges of the tie-flanges, and adjustable clamps upon the flush portion of the chair for securing the rail to said flush portion of the chair.

Automatic Railroad Switch

No. 669,758.

PETER F. MEENAN, of Ridgway, Pa.

In a switch and actuating mechanism therefor, comprising a vertical



shaft, and a star-wheel mounted thereon, a slot-plate, a base-plate having its end portions upwardly deflected and secured to the slot-plate, and a slot-bar having its terminal portions attached to the deflected ends of the base-plate and having its middle portion spaced from the corresponding part of the said base-plate to form a space in which is located the star-wheel, said shaft being journaled in the slot-bar and base-plate.

PERSONALITIES

Robert Dudgeon has resigned as superintendent of the Southern Division of the Delaware, Lackawana & Western, and C. J. Phillips, heretofore superintendent and general agent at Bangor, Pa., is appointed to succeed him, with office at Buffalo, N. Y.

A. H. Thomas, foreman of locomotive repairs of the Pennsylvania lines at Dennison, O., has resigned to accept the position of master mechanic of the Chicago, Milwaukee & St. Paul at Milwaukee, Wis., and is succeeded at Dennison by A. R. Kipp.

E. Balknap has been appointed general Eastern agent of the Seaboard Air Line, with headquarters at Portsmouth, Va., in place of O. D. Ball.

W. J. Miller, foreman of machine shops of the St. Louis Southwestern at Pine Bluff, Ark., has been appointed general foreman of the same road at Texarkana, Tex., to succeed D. M. Doty, resigned. W. B. Hilgardner has been appointed foreman of the shops at Pine Bluff.

John Hill has resigned as master mechanic of the Chicago Terminal Transfer Railroad, and is succeeded by Angus Brown, formerly of the Wisconsin Central.

Samuel Watson, general foreman of the shops of the New York Central & Hudson River at Corning, N. Y., has been appointed foreman of the shops at West Albany, N. Y.

H. G. Scott, formerly with the Buffalo Electric Company, has been appointed superintendent of motive power of the Manhattan Railway of New York.

W. H. Prendegast has been appointed master mechanic of the Central of Georgia at Columbus, Ga., in place of J. L. Whitsitt, who has been appointed general locomotive and car inspector, with office at Columbus, to succeed John H. Davis, resigned.

G. W. Wildin, mechanical engineer of the Plant System at Savannah, Ga., has accepted a similar position with the Central of New Jersey, with headquarters at Jersey City, N. J. Mr. Wildin has been with the Plant System for some years and is a prominent member of the Traveling Engineers' Association.

James Collinson, master mechanic of the Gulf, Colorado & Santa Fe at Cleburne, Texas, has been appointed assistant superintendent of machinery in the office of John Player, superintendent of machinery of the Atchison, Topeka & Santa Fe system at Topeka, Kan.

Thomas Paxton, master mechanic of the Eastern Division of the A., T. & S. F. at Topeka, has been appointed master mechanic of the Gulf, Colorado & Santa Fe at Cleburne, to succeed Mr. Collinson, and G. T. Neubert, heretofore master mechanic of the Middle and Oklahoma divisions, has been appointed master mechanic of the Eastern Division at Topeka, to succeed Mr. Paxton.

C. C. Castle, of the Hildreth Varnish Company, was on February 27 united in marriage to Miss Bonnie, of Louisville, Ky. Mr. and Mrs. Castle will make their home at East Orange, N. J.

William Lander has been appointed assistant master mechanic of the Arkansas and Missouri divisions of the St. Louis Southwestern at Pine Bluff, Ark., in place of C. J. Langston, who has been appointed master mechanic of the lines in Texas, with headquarters at Tyler, Tex.

Clinton L. Rossiter has resigned as president of the Brooklyn Rapid Transit Company and the Brooklyn Heights Railway, and J. L. Greatsinger, president and general manager of the Duluth & Iron Bridge, has been chosen to succeed him.

General Superintendent Spencer, of the Eastern Division of the Canadian Pacific, announces the following appointments: J. E. A. Robillard has been appointed superintendent of the Quebec Division, with headquarters at Quebec, vice W. C. Hall, resigned. W. J. Singleton will assume the duties of superintendent of the Ottawa Division in addition to his duties as superintendent of terminals, vice J. E. A. Robillard, transferred.

Joseph H. McConnell, superintendent of motive power and machinery, has resigned from the Union Pacific R. R. Born September 29, 1843, at Elmira, N. Y., Mr. McConnell began his railroad work in 1861 as a machinist apprentice on the Great Western R. R., now the Wabash, at Springfield, Ill. Later he was a machinist for four years, which were divided between the Chicago, Burlington & Quincy and the Chicago & Alton Railroads. In 1868 he became general foreman of the Union Pacific shops at Omaha, and held that position until 1872. From 1872 to 1885 he was division master mechanic of the Union Pacific at North Platte, Neb., and from 1885 to 1886 was master mechanic of the Nebraska Division. In 1886 Mr. McConnell, with many other active members of the road's working forces, was temporarily retired. Two years, 1886 to 1888, were then spent by him in mercantile pursuits at Omaha. With the accession of Mr. S. H. H. Clark to the presidency of the system, Mr. McConnell returned to the Union Pacific, and for something over two years was engaged in the reorganization of the motive power department and other special work. In February, 1891, he was appointed superintendent of motive power and machinery of the system, and has continued in that position to the present time.

Samuel Higgins, superintendent of motive power of the Lehigh Valley, has been appointed superintendent of motive power and machinery of the Union Pacific, with headquarters at Omaha, Neb., to succeed J. H. McConnell, resigned. Mr. Higgins was born in San Francisco on February 19, 1860, and began his railway career with the New York, Lake Erie & Western in 1881. After serving an apprenticeship, he was until October 1, 1885, successively, machinist, assistant foreman and general foreman of the Susquehanna shops. He was for two years assistant engineer of the motive power department; from October 1, 1887, to April 18, 1892, he was division master mechanic and then assistant superintendent of motive power of the same road until February 1, 1894, when he accepted the position with the Lehigh Valley which he has just resigned.

G. W. Cox has been appointed assistant to the general manager of the Southern Car & Foundry Company, Birmingham, Ala. Formerly Mr. Cox was with the St. Charles Car Company, and more recently in the railroad supply business at St. Louis, Mo.

Onward Bates has resigned as engineer and superintendent of bridges and buildings of the Chicago, Milwaukee & St. Paul, and will open an office in Chicago as engineer and contractor.

H. D. Taylor has been appointed to succeed Mr. Higgins as superintendent of motive power of the Lehigh Valley. He was formerly master mechanic of the Wilkesbarre shops and left the Lehigh Valley Company to go with the Calumet & Hecla Mining Company. Mr. Taylor's quarters will be at South Bethlehem, Pa.

R. E. Janney has been appointed representative of the Sargent Company and the Railway Appliance Company in the East and South. Mr. Janney will have his office at No. 1314 Havemeyer Building, Cortlandt street, New York city, and will sell the specialties of the Sargent Company, namely, open-hearth cast-steel knuckles and locking parts of couplers for repairs, and also a line of cast-steel tools, such as car repair and machinists' hammers, wrenches, coal picks, etc., and for the Railway Appliances Company, the Gilman-Brown emergency knuckle, the O'Brien coupler and the Sargent coupling device.

Charles J. Langston, assistant master mechanic of the St. Louis Southwestern, at Pine Bluff, Ark., has been appointed master mechanic of the St. Louis Southwestern of Texas, with office at Tyler, Tex., in place of J. M. Scrogin, resigned.

James W. Way, for many years chief engineer of the Missouri Pacific, has been appointed consulting engineer of that road, and H. Rohwer, heretofore assistant engineer at Sedalia, Mo., has been appointed chief engineer, with headquarters at St. Louis, Mo.

Mr. Samuel Watson has been appointed Master Mechanic of the Middle Division of the N. Y. Central, with headquarters at West Albany. He will have supervision of all engine-houses and engines on the division, and will assume such other duties as may be from time to time delegated to him by the Division Superintendent of Motive Power.

OBITUARIES

Perley Putnam, for many years and up to 1897 one of the proprietors of the Laconia Car Works, at Laconia, N. H., died on Feb. 19. He was also at one time president of the Burton Stock Car Co.

James S. Potter, formerly superintendent of maintenance of way of the Denver Pacific, and afterward occupying a similar position with the Chicago, Rock Island & Pacific, died at his residence in Denver, Colo., on Feb. 23, at the age of 73 years.

Charles B. Havens, formerly division superintendent of the Union Pacific, died at a hospital in Chicago on March 17 at the age of 52 years. He was born at West Rush, N. Y., on Feb. 17, 1849, and entered railway service in September, 1865, as telegraph operator on the Atlantic & Great Western. In April, 1869, he went to the Union Pacific as telegraph operator, and on July 1 of the same year was made train dispatcher, which position he held until Jan. 17, 1870. He was then for eight and a half years chief train dispatcher, and on July 1, 1878, was appointed superintendent of the bridge division and local freight agent at Omaha. In September, 1882, he was made superintendent of the Eastern and bridge divisions and branches, which position he held until he resigned to engage in the coal business at Omaha. He had been in poor health for some time past and had come to Chicago a week previous to his death to have an operation performed.

MISCELLANEA

The name of the Richmond Locomotive and Machine Works has been changed to the Richmond Locomotive Works. The date of the notice announcing the change is February 9.

The Haines & Noyes Company, 515 Rookery, Chicago, a manufacturer of telephones, switchboards and supplies, realizing that a telephone system is becoming a necessary part of the equipment of modern railways, is devoting much time to an investigation of the subject and has opened a railroad department to supply the necessary apparatus. They have perfected a system whereby talking may be done over the telegraph wires now in use, thus obviating the necessity of new wire construction. They are engaged, also, in working out an interlocking system whereby any two stations may be able to communicate without intervening stations being able to listen.

The Pittsburg Bessemer & Lake Erie R. R. has ordered 1,000 steel hopper cars of 100,000 pounds capacity and 1,000 steel gondolas of 80,000 pounds' capacity from the Pressed Steel Car Company; 10 stock cars of 60,000 pounds' capacity from the Erie Car Works, and 5 cabooses from the American Car & Foundry Company. The gondolas and hoppers will have Schoen pressed steed brake beams, pressed steel arch bars and bolsters, Westinghouse air brakes, Tower couplers, Westinghouse drawbar attachments, French springs, Universal journal bearings, McCord journal boxes. The stock cars will be quipped with Sterlingworth brake beams, Graham drawbar attachments, Damascus bronze journal bearings, wrought-iron bolsters and Tower couplers.

The Texas & Pacific has prepared specifications for 25 simple 10-wheel locomotives, of which 17 will be freight and 8 passenger. The order for these engines has not yet been placed. The passenger locomotives will weigh in working order 156,000 lbs.; have cylinders 19x26 ins.; Richardson balanced slide valves; driving wheels 67 ins. in diameter outside of tire; 33-in. engine truck wheels, extended wagon-top boilers of carbon steel, 62 ins. outside diameter at smallest ring, made for a working pressure of 220 lbs.; firebox of carbon steel, 106 ins. long, 42 ins. wide, 68 ins. deep at front and 56½ ins. at back; 285 tubes, 2 ins. in diameter; heating surface, tubes 2,309 sq. ft.; firebox, 169.50 sq. ft., total, 2,478.50 sq. ft.; grate surface, 31 sq. ft. The freight engines will weigh in working order 158.500 lbs., have cylinders 20x26 ins., Richardson balanced slide valves, driving wheels 63 ins. in diameter outside of tire; 30-in. engine truck wheels; extended wagon-top boiler of carbon steel, 64 ins. outside diameter at smallest ring; firebox, 123 ins. long, 42 ins. wide; 282 tubes, 2 ins. in diameter; heating surface, 2,240.69 sq. ft., firebox 182 sq. ft.; total, 2,422.69 sq. ft.; grate surface, 36 sq. ft. All of these engines will be equipped with United States metallic packing, phosphor-bronze bearings, Westinghouse brakes, National hollow brake beams, Westinghouse train signals, Coale muffler safety valves, Nathan lubricators, Monitor and Ohio injectors, Texas & Pacific standard gauges, Pickering springs, Pyle-National Electric headlights, Pellham's driver brake and release valves.

The Waycott-Andrews Supply Company has taken the agency in St. Louis for the Weber Railway Joint Manufacturing Company.

The 150 ballast cars recently ordered by the St. Louis Southwestern are to be equipped with Monarch brake beams, McCord journal boxes and More-Jones brasses.

At the recent annual meeting of the Shickle, Harrison & Howard Iron Company, of St. Louis, the following officers were elected: George B. Leighton, president; Clarence H. Howard, vice-president; John M. Harrison, vice-president and general manager of works; G. H. Hoblitzelle, secretary, treasurer and purchasing agent.

The Elliott & Hotch book typewriter, has been adopted by the Atchison, Topeka & Santa Fe for the preparation of waybills and statements for the larger stations of the entire system. Mr. M. B. Locke, in charge of the railroad department of the Elliott & Hatch Book Typewriter Company, with offices at 171 La Salle street, Chicago, has opened an evening school for the instruction of railroad employees in the use of the typewriter for waybilling.

Julian L. Yale & Co., through Mr. R. C. Hallett, who represents the firm in the East, have taken the eastern agency for Brown & Co., of Pittsburg, Pa.

The 300 box cars which the Pennsylvania lines will build at their Fort Wayne shops, will be of the class "XH" pattern, 33 ft. 9¼ in. long inside, 8 ft. 2¼ in. wide, 7 ft. 4¾ in. high, and will have a capacity of 80,000 lbs. They will be equipped with pressed steel car bolsters from the Pressed Steel Car Company, Westinghouse brakes, National hollow brake beams, Tower couplers, Westinghouse draft gear, pressed steel and wrought-iron side bearings and Wagner door fixtures.

The order recently placed with the Georgia Car & Manufacturing Company by the Plant System calls for 500 box cars and 100 flats, delivery to begin in April. The box cars will be 36 ft. 8 in. long over end sills and of 60,000 lbs. capacity. They will be equipped with American Steel Castings Company's body bolsters, Westinghouse brakes, Sterlingworth brake beams, Hein and Standard couplers, Butler draw bar attachments, French springs, Ajax journal bearings, National Railway specialty door fixtures. The flat cars will be 40 ft. 8 in. long over end sills and of 80,000 lbs. capacity. The equipment will be substantially the same as for the box cars.

The Universal car bearings have been specified on the following equipment recently ordered: 1,600 box cars for the Illinois Central, 50 engines for the Wabash and 76 passenger cars for the Missouri Pacific.

The American dustguard, manufactured by the American Dustguard Company, of Columbus, Ohio, has been specified on the 1,500 40-ton cars being built by the Pullman Company for the Hocking Valley, and on the 1,200 30-ton cars and 800 40-ton cars under construction by the American Car Railway.

The order placed by the Indiana, Illinois & Iowa with the American Car & Foundry Company calls for 250 coal cars, instead of 500, as reported in the March number of the Digest.

Railroad Accidents to be Reported to the Interstate Commerce Commission

Following is the text of the Act of Congress, approved March 3, 1901, requiring a report of all accidents on railroads to be made to the Interstate Commerce Commission:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, It shall be the duty of the general manager, superintendent or other proper officer of every common carrier engaged in interstate commerce by railroad to make to the Interstate Commerce Commission, at its office in Washington, District of Columbia, a monthly report, under oath, of all collisions of trains or where any train or part of a train accidentally leaves the track, and of all accidents which may occur to its passengers or employees while in the service of such common carrier and actually on duty, which report shall state the nature and causes thereof, and the circumstances connected therewith.

Sec. 2. That any common carrier failing to make such report within thirty days after the end of any month shall be deemed guilty of a misdemeanor and, upon conviction thereof by a court of competent jurisdiction, shall be punished by a fine of not more than one hundred dollars for each and every offense and for every day during which it shall fail to make such report after the time herein specified for making the same.

Sec. 3. That neither said report nor any part thereof shall be admitted as evidence or used for any purpose against such railroad so making such report in any suit or action for damages growing out of any matter mentioned in said report.

Sec. 4. That the Interstate Commerce Commission is authorized to prescribe for such common carriers a method and form for making the reports in the foregoing section provided.

Steel Cars at the Pan-American

Among the interesting exhibits at the Pan-American Exposition at Buffalo, graphically illustrating the great strides taken by the railroads of this country in recent years in the matter of freight equipment, will be that of the Pressed Steel Car Company, of Pittsburgh, Pa. This exhibit will be in the Railway Exhibit Building. This building stands at the north end of the Fair Grounds, but a short distance from the Plaza and Electric Tower. It is through this building that all persons landing at the Terminal Station will gain access to the Fair.

The exhibit will be made up of the following cars:

(1) Box car with steel underframing: capacity, 70,000 lbs.; weight, 36,300 lbs.; length over end sills, 36 ft. 4¾ in.; width over side sill 8 ft. 9¾ in.; height from top of rail to top of running board, 12 ft. 8 in.; Fox pressed steel pedestal trucks, cast-iron chilled wheels, open hearth steel axles, Westinghouse air-brakes, American automatic couplers..

(2) Pressed steel hopper car: capacity 80,000 lbs.; weight, 33,925 lbs.; length over end sills, 31 ft. 6 in.; width over side stakes, 10 ft.; height from top of rail to top of body, 9 ft. 10 in.; pressed steel diamond trucks, cast-iron chilled wheels; open hearth steel axles, New York air-brakes, pressed steel brake beams, Schoen standard twin spring attachment, draft rigging; Janney couplers.

(3) Hopper ore car: capacity, 100,000 lbs.; weight, 28,500 lbs.; length, 24 ft.; width, 8 feet; height, 9 ft. 6 in.; pressed steel diamond trucks, Bryan draft rigging, Chicago coupler.

(4) Pressed steel flat car: capacity, 100,000 lbs.; length over end sills, 40 ft.; width over stake pockets, 10 ft.; height from top of rail to top of floor, 3 ft. 10¾ in.; pressed steel diamond trucks. cast-iron chilled wheels, open hearth steel axles, Westinghouse air-brakes, pressed steel brake beams, Gould couplers.

(5) Pressed steel flat bottom gondola car with twin hoppers: 95,000 lbs. capacity; weight, 34,000 lbs.; length over end sills, 37 ft. 6 in.; width over side sills, 10 ft. 2½ in.; height from top of rail to top of body, 7 ft. 5¼ in.; depth of car body, 3 ft. 11 in.; pressed steel diamond trucks, cast-iron chilled wheels, open hearth steel axles, Westinghouse air-brakes, pressed steel brake beams, M. C. B. draft rigging, Tower coupler. This is practically a new design of car and is similar to a large number being built for the Pittsburgh & Lake Erie and Rio Grande Western railroads.

Novel Method of Promoting Traffic

Merely for the asking, farmers along the Seaboard Air Line may in the future have the use of fancy bulls and roosters of the most aristocratic breeds for ninety days at a time.

In accordance of an elaborate plan, whereby it hopes to increase the road's earnings and encourage the breeding of fine cattle and poultry by farmers and cattle raisers along its line, the company has launched into a novel scheme, which is more or less philanthropic in its nature. The Industrial Department of the road has purchased a large number of bulls and roosters, which will be loaned to farmers free of charge for breeding purposes. To prospective beneficiaries the company has sent a circular letter, setting forth the different breeds it can furnish and giving the conditions under which they can be obtained. This has been distributed through the company's agents. The circulation of the company's bulls is to be on the same basis as that for the roosters. The blank forms that accompany these circulars read:

Dear Sir:—Please arrange to deliver S. A. L. Bull to M.—— S. A. L. Station Agent at ——, the ——, who will ship him to —— on said date. Please confer with Mr. —— for the shipment of said animal on the date above named and oblige, yours truly, J. STRANG, A. C. I. A.,
Care Seaboard Air Line, Portsmouth, Va.

Lithographs and booklets advertising the novel plan are soon to be issued and widely distributed. The company requests that the roosters and bulls be kept from annoyance and possible harm from other animals on the farm, but that is practically the only condition of the loan. J. C. Horton, Eastern Passenger Agent of the Seaboard Air Line, said that he was sure the scheme would prove a great success.—N. Y. Herald.

LARGER FREIGHT CARS FOR GERMAN RAILROADS.—Consul-General Guenther sends the following from Frankfort, Feb. 27, 1901:

The latest number of the Central News of the Construction Bureau points to what it calls a great progressive step in railroad traffic, viz., the experimental introduction of three-truck freight cars of 25 tons each, in place of the two-truck cars of 15 tons each as maximum capacity in common use. The experiment was asked for by the Rhenish mine operators. A former experiment with four-truck cars proved unsatisfactory, as the cars were too heavy in iron and in their gross weight, and many of the wheels could not be used elsewhere, especially on the mine roads and factory switch roads. The three-truck cars, however, which will not be much heavier than the present cars, have not these disadvantages. They will, to a large extent, obviate the ever-recurring car famine and will be much more economical in handling. Furthermore, it has been demonstrated, both in theory and practice, that the wear and tear of the track is less with these larger cars. Both the shipper and the railroad management will be benefited by the use of these large truck cars.

STREET-CAR HEATERS IN GERMANY.—Under date of Feb. 11, 1901, Consul Warner, of Leipsig, reports that there is great need for electric heaters in the street cars of that city, the three electric street railways in and about Leipzig not having a single car which is heated either by electricity or coal on the coldest days in winter. Formerly, when horse cars were in use, they were heated by placing coals of fire in iron boxes; but, after several months' trial, the system was abandoned. It is not because there is no cold weather during the winter months, says the Consul, that street cars in most of the cities of Germany are not heated, but because the city authorities do not compel the street railway companies to make their cars comfortable; and, unless required to do so by law, they will not put themselves to this extra expense. Mr. Warner urges the introduction of American electric street car heaters, but adds that, in order to meet with success, it will be necessary, first of all, to convince the authorities of the fact that the health of the general public is greatly endangered by riding in unheated cars during the winter months.

Record of New Equipment

Ordered during the Month of March 1901

CARS

Ordered by	No.	Class.	To be built by
A., T. & S. F.	9	Postal.	
Arizona & Southw.	4	Passenger.	Barney & Smith Car Co.
Bell. Bay & B. C.	10	Flat.	Illinois Car & Equip. Co.
Brook. Elevated	50	Passenger.	J. G. Brill Co.
Canadian Pacific	60	Flat.	Own shops.
“ “	6	Fruit.	“ “
“ “	6	Bag.	“ “
“ “	10	Passenger.	“ “
“ “	2	Weed burners.	“ “
Chatta. South.	35	Box.	Am. Car & Fdry. Co.
Choc., Okla. & G.	250	Coal.	“ “ “ “ “
“ “ “ “	22	Passenger.	Am. Car & Fdry. Co.
C., N. Y. & B. R. C.	500	Refrigerator.	Own shops.
Chic. Gt. West	70	Flat.	Am. Car. & Fdry. Co.
Chic. W. P. & S.	1,000	Chair.	“ “ “ “ “
Ch., R. I. & Pac.	11	Cars.	“ “ “ “ “
“ “ “ “ “	8	Passenger.	“ “ “ “ “
“ “ “ “ “	4	Baggage.	“ “ “ “ “
“ “ “ “ “	6	Bag. & mail.	“ “ “ “ “
“ “ “ “ “	2	Dining.	“ “ “ “ “
Chic., Mil. & St. P.	1,000	Box.	“ “ “ “ “
Colorado Southern	400	Coal.	Pullman.
“ “	2	Baggage.	“
C., C., C. & St. L.	40	Coaches.	Barney & Smith Car Co.
Del., Lac. & W.	15	Passenger.	“ “ “ “ “
“ “ “ “	15		Pullman.
Grand Trunk	4	Passenger.	Own shops.
Intercol. of Canada	13	Passenger.	Barney & Smith's.
Missouri Pacific	2,500	Box.	Amer. Car & Fdry. Co.
N. Or. & N. E.	1,000	Freight.	Southern Car & Fdry. Co.
N. Y. Central	600	Box.	Amer. Car & Fdry. Co.
North. Pacific	75	Refrigerator.	Own shops.
“ “	150	Stock.	So. Baltimore Car Works.
P. B. & L. E.	1,000	Hopper.	Pressed Steel Car Co.
“ “ “	1,000	Gondola.	“ “ “ “
“ “ “	10	Stock.	Erie Car Works.
“ “ “	5	Caboose.	Amer. Car & Fdry. Co.
Pennsylvania	25	Passenger.	Jackson & Sharp Co.
“	500	Gondola.	Own shops.
“	300	Box.	“ “
“	9	Combination.	“ “
Plant System	500	Box.	Georgia Car & Mfg. Co.
“ “	100	Flat.	“ “ “ “
Peoria & Pekin Un.	75	Coal.	Amer. Car & Fdry. Co.
Raquette Lake Ry Co.	2	Passenger.	Jackson, Sharp & Co.
South. Pacific	100	Ballast.	Rogers Ballast Car Co.
South. Indiana	2	Passenger.	Barney & Smith Car Co.
St. Louis Southw.	3	Chair.	Amer. Car & Fdry. Co.
Texas Pacific	1,000	Freight.	

LOCOMOTIVES

Ordered by	No.	Class.	To be built by
A. T. & S. F.	25		Baldwin Loco. Works.
Balt. & Ohio	1		Pittsburgh Loco. Works.
Canada Atlantic	1		Baldwin Loco. Works.
D., L. & W. R. R.	80	Freight.	
“ “ “ “ “	6	Passenger.	
Dominion Atlantic	2	Passenger.	Baldwin Loco. Works.
Grand Trunk	8	10-w. pass.	Own shops.
“ “	14	Mogul.	“ “
Gt. North. of Can.	4		Cooke Loco. Works.
Ind., Ill. & Ia.	12		
Internat'l & Gt. N.	5	Passenger.	Cooke Loco. Works.
Illinois Central	1		
Kanaw. & Mich.	5	Consol'n.	Baldwin Loco. Works.
Long Island R. R.	2	Atlantic.	“ “ “
“ “ “	3	10-wheel.	“ “ “
“ “ “	1	Switcher.	“ “ “
Louis & Nash	10	Consol'n.	Cooke Loco. Works.
Maine Central	3	10-w. pass.	Schenectady Loco. Works.
N. C. & S. L. R. R.	12		Baldwin Loco. Works.
Norfolk & Southern	1		“ “ “
Oregon Short Line	1	Consol'n.	Cooke Loco. Works.
Penn. R. R.	27	Passenger.	Own shops.
Peoria & Pekin Un.	1	Switcher.	Brooks Loco. Works.
“ “ “ “	1	Mogul.	“ “ “
Plant System	3	Switcher.	Richmond Loco. Works.
Quebec Southern	1	Mogul.	
Southern Railway	35		Baldwin Loco. Works.
Texas & Pacific	25	10-wheel.	Cooke Loco. Works.
Western Maryland	10	Consol'n.	Baldwin Loco. Works.

"A recent freight wreck on the Baltimore & Ohio demonstrated beyond a shadow of a doubt the superiority of the new steel cars over the wooden equipment which they are rapidly replacing. The train was made up of several steel cars, between which were at least half a dozen box cars of the ancient wooden type. The force of the collision threw the wooden cars into the air like so many sticks, while the steel cars remained intact. Trainmen say that when the steel cars come into general use, destructive freight wrecks will be a thing of the past. On numerous occasions it has been shown that the metal cars seldom leave the track in case of a collision, and in the majority of cases they suffer little damage. In the matter of durability, the trainmen say the steel car is far superior to the old style wooden equipment, and while they are more expensive to manufacture the difference in price is saved in the matter of repair work."—Pittsburg Leader.

The steel cars referred to were designed and built by the Pressed Steel Car Co., of Pittsburg, Pa.

The position which the Pierpont Morgan organization holds with reference to the business and political world is discussed by Mr. John Brisben Walker, in the April Cosmopolitan, under the title, "The World's Greatest Revolution." Familiar with the business world as a student of affairs, Mr. Walker has, while approving of the general idea of concentration, drawn a picture of the power now exercised which will be a surprise to the great majority who have not given this subject thoughtful attention.

During the month of March the Pressed Steel Car Company built and shipped 2,609 freight cars, an average of 100 cars for each working day. The largest average for any month prior to March, 1901, was 72 cars a day.

Simplex bolsters will be used on the 2,000 Michigan Central cars recently let to the American Car & Foundry Co.; also on the 600 Wheeling & Lake Erie cars to be built at the South Baltimore Car Works, the 400 Northern Pacific stock cars to be built at the same place, and 250 L. & N. cars to be built at the company's shops.

The Pressed Steel Car Co., of Pittsburg, Pa., is establishing a new record so far as their daily output is concerned. During the week ending March 16, the company built and shipped 636 freight cars, a daily average of 106 cars. The shipments consisted of 467 hopper cars and 169 box cars.

The Keuffel & Esser Co. has established a branch house at 303 Montgomery street, San Francisco, Cal., for the convenience of its customers on the Pacific Coast.

Mr. H. T. Newcomb has resigned the position of Chief of the Division of Agriculture in the United States Census Office, and will hereafter have full charge of the news and editorial columns of the Railway World.

J. L. Johnson, for several years Master Painter for the Denver Street Railroad Company, has gone to Salida to take the position of foreman painter for the Rio Grande Railroad Company.

The Detroit Steel & Spring Co., of Detroit, Mich., during February showed the largest tonnage output of any month in the history of the concern.

The Handy Car Equipment Company, Old Colony Building, Chicago, are having a sample car built by the Illinois Car & Equipment Company, which will be used for exhibition purposes. The car will be equipped with the following specialties: Chicago roof, Westinghouse air brake, Monarch draft rigging, Bettendorf body bolster, Kindl truck, A. French springs, Monarch brakebeams, Springer safety coupler, Brown journal boxes, National journal bearings furnished by the National Railway Specialty Company, Corning brakeshoes, Security door fixtures, Star grain door, Bass Foundry & Machine Company's wheels, Devoe & Reynolds' paint.

Reports from Birmingham, Ala., state that the Southern Car & Foundry Company will soon begin work upon the $1,000,000 plant to be erected between Ensley and Wylam, Ala. The site is now being surveyed. Since the decision was reached to erect this plant in the Birmingham district, the general offices of the company have been moved to that city.

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EDWARD A. PHILLIPS ALBERT G. GLOVER
GEORGE S. HODGINS, Editors

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Stone Signals

At first sight the words "Stone Signals," might lead one to suppose that while most inventors are busy with electric signals, parabolic lenses of various colors, and interlocking machinery generally, that some one had invented some sort of huge stone semaphore, which might, with perfect propriety have been used to regulate the chariot traffic at the gate of some city in the palmy days of Ancient Rome. On consulting Sekon's Directory of Railroad Words, however, automatic stone signals are found to be certain semaphores used on English railways. The normal position of the signals is "off." In connection with these semaphores, wires are placed along the side of the railway where a fall of rock is likely to take place. Should such a fall occur, the wires are broken and the signals automatically go to "danger." In some instances the breaking of the wires also causes electric alarm bells to ring in adjacent signal boxes, thus giving notice of a fall of rock.

Boiler Inspection in Canada.

A bill has been introduced into the legislature of the Province of Ontario, called "An act for the protection of life and property in the use of stationary boilers and engines, and the examination and licensing of persons in charge of them." The bill provides for the examination of persons having charge of boilers and engines and the issuing of a certificate of competency for one year. It provides for the periodical inspection by government inspectors of all boilers and steam plants affected by the act, and the ordering of repairs when deemed necessary by the inspector. A fine may be imposed by any justice of the peace for non-compliance with the inspector's orders. Any accident or explosion must be reported to the government inspector in whose district the explosion has occurred, and the inspector is empowered to make a thorough inspection, examination, and report to the Commissioner of Public Works.

This act brings boiler users in Canada under similar supervision to that exercised by the Board of Trade in Great Britain.

A Suggestion Concerning Tool Cars

The Strand Magazine, of London, England, in a recent issue has an article descriptive of "The Breakdown Train." It contains what may possibly be a useful hint, to some at least, in this country. In describing the tool-van, it says that the interior is painted a clear white, the object being to throw every article into greater relief, for every jack, every lever or wrench is painted a ruddy vermilion. We think the painting of the interior, sides and roof a pure white color, is a good idea. On many roads the tool car is simply a box car set apart for this special purpose, with interior partially weather-stained and dark. At night, when in use, the car is often only dimly lighted by the feeble rays of a lantern or a smoky torch. A white interior would certainly help to better diffuse what light there might be. The tool-car is usually locked up when not in service, and is, in consequence, rather dark inside, and it has no means of drinking in the sun's rays. Were it not for this fact luminous paint for tool-car interiors might be found advantageous. As it is, whitewash is bright, healthful, cheaply applied and easily renewed. It is used on many railroads to paint road-crossing fences and sometimes bridge floors, with the object of being as conspicuous as possible at night.

Electric Shock Accidents

We desire to call attention to the precautionary instructions issued by the general manager of the Liverpool Overhead Railway, which appears in the Digest among Medical and Surgical Matters. Mr. Cotterell gives the employes under him, directions as to the proper procedure to follow in rendering what may be called First Aid, to persons stricken by electricity, and shocked into insensibility. The method of resuscitation is, briefly, to produce artificial respiration, just as one would do with persons who had been partially drowned, and, of course, to send for medical aid with as little delay as possible. The manager speaks with confidence of the "Laborde" system. He says that recent experience has shown that this system has been very successful. It is therefore the duty of those who are in a position to render assistance to such a sufferer, after getting him free from the electric wire or cable, which had caused the shock, to resolutely persevere in the work of restoration by inducing artificial respiration, not only up to the point where the patient exhibits signs of returning consciouness, but until he is able to breathe freely and regularly without assistance, after which rest and warmth will hasten complete recovery.

Dr. Peter J. Gibbons, of Syracuse, N. Y., by request, gave the Royal Canadian Humane Association, a statement of his method of restoring persons struck by lightning or shocked by dynamic electricity, which the Association published with other matters, in pamphlet form. Dr. Gibbons has devised special apparatus, but the general directions he gives are, briefly, that the rescuer should not waste precious time taking the patient to a house, unless the weather is intensely cold. He says, secure a return of breathing first, protecting him from severe cold by coats, blankets, etc., if necessary. Keep bystanders off fifteen or twenty feet, place him on his back, loosen all tight clothing, remove false teeth and foreign bodies from mouth and nose, if any are there. To excite breathing resort to Sylvester's method, or to any of the well-known methods for resuscitating from drowning, remembering that there is, in electric shock cases, no water to be expelled.

In this connection it may be interesting to give an extract from the pamphlet referred to. On page 40, an account is given of an accident which Prof. d'Arsouval reported to the French Academy of Science. He says, "A sudden sparking of one of the dynamos of the electric-light station of St. Denis, near Paris, indicated a short circuit on the line. The dynamo was quickly cut out and stopped. The voltmeter reading was 4,500 volts between two wires, and the ammeter read 750 mille-amperes on the wire. The accident occurred at a place where three wires were supported eighteen feet above ground on a bracket fastened to a stone wall. The bracket carried several cross-pieces, and on the lowest sat the laborer who had received the shock, holding the conductor with one hand. He had been sent up to fasten a telegraph wire he held, and thus short circuited the current through his hand back to earth. The man had therefore, received a 4,500-volt current of fifty-five alternations per second, perhaps for several seconds, and when

he was found, fully a quarter of an hour had elapsed since he received the shock. He gave no sign of life, and it took another half hour to remove him from his perilous position and stretch him on the ground. The attempt was at once made to cause his lungs to act by moving the arms alternately up and down, but without avail. The mouth was then forcibly opened and the tongue was pulled out and allowed to recede, this being the best method of producing respiration, artificially. The lungs actually began their functions almost immediately. Two hours later the man was able to speak. He had burns on his hand, but otherwise was not injured."

The Electrical Review has for some time past reiterated its belief that the electric current does not kill. The Review even doubts the ability of the current to cause death in the case of a criminal who suffers what is called electrocution. If the contention of the Review is correct, and if the use of the methods advocated by Dr. Gibbons, and embodied in the instructions issued to the employes of the "Liverpool Overhead," are efficacious, then it is of the utmost importance for the public at large, and particularly those who have to do with electrical machinery, on our railways and in shops and factories, not to be mislead by the apparent stamp of finality which the practice of inflicting capital punishment by means of an electric current seems to put upon the whole question. In the light of such facts as are at present obtainable, the only obvious, rational and humane course to adopt is for the onlooker, in every case of prostration due to electric shock, to act promptly upon the belief that the sufferer is not dead, but only temporarily insensible, and in the interval before competent medical assistance arrives, to try every known means and to faithfully persevere in the endeavor to produce respiration by artificial means, just as if the unfortunate man had been dragged out of the water before his eyes in a totally helpless and unconscious state.

FIRST AID TO THE INJURED IN RAILROAD SERVICE

The Railroad Digest addressed by letter, a large number of railroads in the United States and Canada on the subject of First Aid and by the courtesy of many of those addressed it is able to present a synopsis of work accomplished in this matter, and also in the matter of medical and surgical attendance to injured employes or passengers. We think that while there is opportunity for improvement, and room in the ranks for others to fall in line, yet we are able to present a very good showing indeed.

First Aid is not medical or surgical attendance, nor is it designed to take the place of professional skill. It is, as its name implies, simply the first aid rendered in the absence of a properly qualified practitioner. It is a mistaken view of what "first aid" really is, if it be imagined that men instructed in that art become embryo physicians and surgeons. We make bold to say that proficiency in First Aid is not as difficult of attainment as is a thorough knowledge of the air brake. First Aid will prevent men from making bad worse, in case of accident, and, not being permanent treatment, cannot give ground for any claim for malpractice.

A contemporary, the Railway Herald, of Atlanta, Ga., dealing with the subject of First Aid, in its April issue, puts forward some arguments against the introduction of the practice on railroads, with which, in all due defference, we cannot agree. The Herald says, "to go about such a plan on an elaborate scale is a little unfortunate, in that it presupposes a continued possibility of accident, when the highest state of efficiency of railway operation does not admit that possibility." To this we reply, instruction in First Aid does imply the possibility of accident, and further we say that no railroad or transportation company in this world has yet attained to such a state of efficient operation as to preclude that possibility. The best operated railroads still have accidents. The higher the standard of efficiency the fewer the accidents; but possibility of accident does not mean probability. The Herald thinks that the proper thing to do is to prevent accidents, and "to make passengers feel that they are safe, not that their wounds will be dressed properly." A railway which does not make its patrons feel safe, had better go out of business. The question is, however, with the possibility of accident ever before you, from which there is no escape, what are you going to do? Ignore it or prepare in some way for the continuance, happily remote, though it may be? Which is the wiser course?

If it was not for the possibility of accident, why should a railroad equip and maintain wrecking cars, with men ready for call day or night. Why should steamships carry life preservers and life-boats, if the liability to accident could for one moment be safely ignored? Why should theatres provide fire exits and hotels fire escapes, if nothing could go wrong? Or why should George Westinghouse have labored to perfect the emergency action of triple and brake valves, if sane men could truly say, we have eliminated possible accident, and for us danger has ceased to be.

The Herald further says, "How would it look in this day of perfection in the safety of travel, for, say the "Sunset Limited," to advertise an ambulance corps on board, as one of its attractions?" Look at the expression "perfection in the safety of travel." "Perfection" is only a relative term when so used. Dr. W. L. Estes, chief surgeon of the Lehigh Valley Railroad, says that, "The Interstate Commission shows in round numbers that there were 51,743 railroad casualties to persons in the year just ended and the total casualties in the British army in the war in South Africa, up-to-date, amounts to 48,000."

The Railroad Digest does not undervalue the wonderful advance in the direction of safety in travel, made and being made, on all the railroads of America, but in calling attention to the thoughtful expressions of enlightened opinion (given below in alphabetical order), from men eminent in their various callings, the Digest does not shut its eyes to the possibility of accident, or to the nobly humane endeavors which have been made to alleviate human suffering, by First Aid, on railroads or to give an injured man, by means of the best medical care, a fair chance for recovery, to which the civilization of this country entitles him.

WHAT OUR RAILROADS ARE AND ARE NOT DOING TO PROVIDE FIRST AID TO THE INJURED.

The superintendent and chief surgeon of the Relief Department of the Atlantic Coast Line writes that the Atlantic Coast Line has not taken any steps toward the education of its employes in rendering First Aid to the injured. "Generally speaking, we are so well provided with local surgeons over the lines that this has hardly seemed necessary. A great many of our employes are negroes of very meagre intelligence, and it would be a difficult matter to give them training in the direction indicated in your letter."

The first vice-president of the Boston & Maine Railroad says: "I desire to say that, with the exception of talks to our employes by our surgeons, no systematic effort has been made to instruct our men along these lines; the principal reason being that our yards are all near great centres, where medical aid can be secured at very short notice, and it is very seldom that we have accidents at any point where medical aid can not be immediately secured."

The General Superintendent of the Buffalo, Rochester and Pittsburgh Railway writes: "I herewith enclose you copy of our instructions to employes on First Aid to the Injured."

The instructions referred to deal with the treatment of wounds and bleeding, tell where and how to apply an ordinary bandage, how to stop hemorrhage and the way to distinguish between blood from an artery and that from a

vein. One rule printed in capital letters conveys what we believe is an oft-needed caution. It says: "Never apply tobacco quids or other filthy substances to a wound." Shocks, weakness or prostration and the transportation of the patient are also included. The instructions close with the admonition to call the company's nearest surgeon.

The General Agent of the Burlington, Cedar Rapids and Northern Railway, replying to The Digest's enquiry, says: "This railway has, we think, a very thoroughly arranged surgical department in operation for the care of its employes or others, who may be injured on the railway. That is, we have a designated surgeon at each town along our line where it is possible to secure one, and have never as yet met with a failure to secure the services of a surgeon to give the necessary assistance to injured persons."

The manager of the Canadian Pacific Railway writes that "the company has not done anything in the way of educating employes in first aid, beyond printing a few simple instructions in the book of rules."

The C. P. R. Rule Book contains some plain, practical instructions in the matter of first aid, dealing with cases of dislocations, fractures, hemorrhage, and the like.

The chief surgeon of the Chesapeake and Ohio Railway says that "The International Association of Railway Surgeons, which meets in Milwaukee in the near future, will present a report of the committee appointed to formulate instructions for First Aid to the Injured. When that report is received and discussed, it may be adopted by the C. & O. R'y Co. We have surgeons in the employ of the company so located as to render very prompt aid, and it is desirable always to have the aid rendered by a competent physician, if possible to do so."

The president of the Chicago, Burlington and Quincy Railroad says: "We look after the matter through the medical officers of the company."

The special claim agent of the Chicago, Milwaukee and St. Paul Railway says: "We have never adopted any system for providing employes with the requisite knowledge and means of rendering First Aid to the Injured in case of accident, other than to appoint local surgeons along our lines. Our system of appointments of local surgeons and arrangements for the care of injured at local hospitals along our line is so perfect that we seldom fail in affording immediate and prompt aid to injured persons, and consequently have not experienced any serious need for improvement in that direction."

The general claim agent of the Chicago, St. Paul, Minneapolis and Omaha Railway says: "Our organization standards being very high, we have very few accidents. Our territory is populous and stations close together, and carefully selected surgeons are within call on short notice. Special action is always taken. Our employes are enjoined and informed by general instruction to render all practicable temporary aid."

The surgeon-in-chief of the Chicago, Rock Island and Pacific Railway answers our enquiry by saying that he has been talking up, and working for, First Aid, for several years past, and has been expecting a book to be published this year, with which to start classes. No formal work has yet been done on this road.

The assistant general superintendent of the Chicago and Eastern Illinois Railway replies, as follows: "I regret to report that our employes have not been fully instructed on this subject. The rule covering cases of this kind and which is expected to be known by the employes, reads as follows: "Whenever passengers or employes are injured everything must be done to care for them properly, either calling the company's nearest surgeon to treat them (and if seriously injured, calling the nearest competent surgeon to be had to attend them until the company's surgeon can get to the place of the accident), or, if they are able to be moved, taking them to the nearest place at which the company has a surgeon, and turning them over to him for care and treatment. I understand that many other railroads furnish their train employes with a kit consisting of absorbent cotton, bandages, rubber bands, etc., with instructions as to how they are to be used. I am glad that you brought up the question, and if you find that some of the roads have better practice than others we shall be glad to hear from those amongst the best in order that we may make proper provision in our train equipment."

The President of the Cincinnati, Hamilton and Dayton Railway says: "In all cases of injury to passengers or employes requiring medical attention or surgical aid, the nearest regularly appointed surgeon of the company is called without delay, and the case put in his exclusive charge. In case of sudden emergency when the attendance of the company's regular surgeon cannot be had at once, the nearest physician is called to attend the patient until the arrival of the company's regular surgeon, when the other physician is relieved. We have appointed at each station surgeons and their assistants and either one or the other is invariably able to respond promptly to our summons."

The General Manager of the Cincinnati, New Orleans and Texas Pacific Railway says: "I enclose copy of an article which I wrote on this subject, briefly outlining our practice, which was published in the Railway Age in 1898, and I would further state that all our freight cabooses, baggage cars and relief or wrecking cars are equipped with medicine chests, and we also have chests located at all important terminal stations on the line. The question of First Aid to the injured is an old one with us; we have made it a study and all our men are well educated in this respect. In addition to the equipment above referred to, we have an arrangement by which the surgeons along the line give lectures at regular intervals to the men, at which lectures a subject is stripped and a practical demonstration is made to the men of the proper action to be taken in case of accident."

In the article referred to as having been published in the Railway Age, Mr. W. J. Murphy, general manager of the C. N. O. & T. P., says: "The necessity for such knowledge is admitted by every one connected with the operation of a railroad. The duties of trainmen on all railroads, especially those in the freight service, are, to say the least, hazardous. For this reason the management of this line has considered it advisable, not only in the best interests of the employes, but in the interest of humanity, to educate the trainmen in a general way as to first aid to the injured."

The Secretary of the Lackawanna Y. M. C. A. says: "The Hoboken division of the Delaware, Lackawanna and Western Railroad is, through the agency of the Y. M. C. A., well equipped in the matter of First Aid. The company supplies emergency boxes, and the association furnishes the contents. There is a complete hospital outfit at the Hoboken terminal, equipped by expenditure of Y. M. C. A. funds, while the room is provided by the railroad. This is intended for the benefit not only of the Lackawanna employes, but, also, for the United States Express Company's men, and those of the Hoboken and contributing ferry companies. During the winter a course of lectures were given by medical men, and at the close of the course examinations were held, and the successful candidates each received a diploma and a First Aid outfit. This outfit, in case of passenger men on the railway, is placed on the train with which each is connected. The matter of providing freight men with instruction is now under consideration. At all important points along the road large stationary boxes are placed. D. L. & W. packet contains, besides materials usually found in emergency boxes, a bottle of spirits of ammonia, a bottle of witch-hazel and some instruments requisite for surgical work. No attempt is made to supersede the physician in first aid work. What is done is for the purpose of bridging over the critical interval between the accident and the arrival of the doctor."

The general superintendent of the Denver and Rio Grande Railroad writes: "I do not think I can explain the system in use on the D. & R. G. Railroad relative to providing employes with the requisite knowledge and means for rendering First Aid to the injured in case of accident any better than to attach our form No. 4,418; one of these forms is in each chest, and one of these chests is with each train."

The form referred to, names the contents of the emergency case, and gives directions for use. A couple of illustrations show the way to apply a tourniquet made out of

a handkerchief or other handy piece of cloth or cord. The form also tells how one should deal with cases of fracture, bleeding wounds, dislocations, burns and scalds, fainting, or with that physical condition, known as "shock," which generally follows an accident.

The general manager of the Lake Erie and Detroit River Railway says: "It is our intention on the completion of the present extension of our line to St. Thomas to re-organize our medical department, and, when that is done, First Aid will, in all probability, be taken into consideration."

The general manager of the Ferrocarril Interoceanico de Mexico writes: "I beg to say that we have included in our Book of Regulations the necessary rules and instructions to enable our employes to render First Aid to the Injured. A medicine chest is carried on all our passenger trains."

The claim agent of the Great Northern Railway Line replies: "All our passenger trains are equipped with an emergency case, filled with such things as our chief surgeon deemed necessary for aid to injured persons while away from a doctor. Conductors and trainmen have been drilled on the use of the contents, as well as laymen could be, under lectures given by our chief surgeon. Every freight train caboose is also supplied with an emergency case, though not so complete as on passenger cars. At our shops and other convenient points on each division we have the aid case and stretcher outfit complete, with pillows, blankets and rubber blankets; thus we are able to give both employes and passengers prompt attention before the arrival of a surgeon. This railroad has no hospital system, but the benefits of hospital treatment are secured by the company."

The general superintendent of the Hocking Valley Railway writes: "We have issued no printed instructions in connection with this subject, but we have instructed our men from time to time as to the means to be taken to prevent the loss of blood, by the use of a cord tightly wound above the part injured. It occurs to me that the movement you have started is a worthy one, and I think it will be productive of much good, although I might add that if such instructions had been issued when our line was first constructed they would not have been put into use, so far as the travelling public is concerned, up to date, as we are glad to say, that in the history of our road we have never maimed or killed a passenger."

The president and general manager of the Kansas City, Fort Scott and Memphis Railroad says: "We did for a time furnish some of our trainmen with boxes prepared by our chief surgeon, but we found that they were seldom used, and because they were not given regular inspection some of the articles were lost and the quality of others deteriorated in time; we, therefore, decided to discontinue the use of boxes except on our official cars."

The chief claim agent of the Lake Shore and Michigan Southern Railway replies: "We furnish emergency cases to all train crews with brief instructions for first aid to the injured."

The chief surgeon of the Lehigh Valley writes as follows: "In 1886 I introduced on the Lehigh Valley Railroad little tin cases (emergency boxes), which contain bandages, sterilized gauze, lint and two rubber tourniquets, besides a few other articles for the purpose of furnishing means of rendering First Aid to injured persons. A little later I gave some instruction to station masters and employes in the principles of First Aid. Since then these emergency boxes have proved very useful and efficient, the number of boxes having been greatly multiplied. We have them now on every passenger train in charge of the conductor, in all the wrecking cars, at every station and in all the private cars. I am sorry to say the management has allowed instruction in First Aid to be discontinued. I hope, however, to have it revived and to be able to make it regular and efficient. I am glad to know you are taking up this matter. I consider it of great importance, and I believe an efficient First Aid service ought to be established in every railroad in the United States. There has been lately some agitation in favor of hospital cars on railways, but in my opinion they cannot, on long lines, be made efficient for First Aid. I send herewith a paper I recently read on the subject."

A resumé of the paper on Hospital Cars by Dr. W. L. Estes will be found in the present number of the Digest, among medical and surgical matters.

The general superintendent of the Long Island Railroad Company says that "During the past three years this company has by periodical lectures instructed its employes as much as possible in First Aid to the injured. We have also located at various points on the road, and in cars, small surgical cases containing bandages, etc., with full printed instructions as to their use in case of accident. We have also fitted up in most perfect detail an hospital car which is sent to places where accidents of a serious nature occur. We have also distributed among our trainmen books on First Aid to the Injured, and, in the lectures, we inaugurated classes and put the employes through a series of examinations, etc., to ascertain their knowledge of the subject matter of the lectures given."

The general superintendent of the Michigan Central Railroad writes: "We have on our divisions 145 emergency boxes at present in service. These are distributed in private cars, way cars, baggage cars, in steam shovels, in yard master's offices, and round houses. The boxes, which are of galvanized iron, are 13½ x 4 x 7 inches, and contain one tourniquet, one can bi-carbonate of soda, one bottle of aromatic spirits of ammonia (sal volatile), one box carbolic ointment, one roll rubber plaster, six cotton roller bandages, one piece cotton cloth, one piece cotton cloth for sling, two packages absorbent cotton, one package surgical lint, one pair scissors, one package of pins, two splints, 13½ inches long; two splints, 10 inches long, and one sponge. The boxes are numbered and sealed and a record kept of conductor, car foreman or yard master to whom they are delivered. Cards giving directions how to use the contents of the boxes are placed in baggage cars, way cars, shops, etc., and lectures on First Aid to the Injured were delivered to all enginemen, trainmen and yardmen by Dr. E. W. Smith, division surgeon, and assistants, when boxes were first put in service in May, 1895. We are now arranging to repeat this series of lectures. Whenever any of the boxes are used for any purpose our surgeon is notified, and he at once arranges to replenish and reseal the boxes."

The vice president and general manager of the Minneapolis and St. Louis Railroad replies: "We have local surgeons at numerous stations along the line of our road who are always readily accessible in case of accident. In addition, we provide what are known as surgical emergency cases, which contain instructions so that any train man could use them in case of necessity. Further than this there has been nothing done to educate employes in the matter of First Aid to the Injured."

The general manager of the Nashville, Chattanooga and St. Louis Railway says that "the matter has been taken up with the chief surgeon, and, although no steps have up to the present time been taken, the company expects to make some headway in the matter during the coming summer."

The secretary of the Railroad Branch of the Y. M. C. A., of New York, writes regarding the New York Central Railroad: "Lectures on First Aid to the Injured have been given at the different railroad branches of the Y. M. C. A. located on the lines of the New York Central. Through the efforts of Dr. W. S. Webb some emergency boxes have been put upon the Adirondack Division. We have published in Railroad Men, the organ of our association, one or two series of articles on first aid to the injured, with illustrations."

The General Superintendent of Transportation of the Pennsylvania lines west of Pittsburgh writes: "We have in all caboose cars of our freight trains a medical box containing surgical appliances for use in case of emergency, and for several years we carried these on passenger trains, and on all our engines, but found so very little use for them that we discontinued their use, except in our caboose cars."

The surgeon of the Pittsburg & Lake Erie Railroad states that "the company has adopted and is putting into practical use as rapidly as possible the First Aid methods. Each caboose and baggage car will carry a folding stretcher, holding splints and blankets and a First Aid emergency box, the latter containing "First Aid" packages, sublimate gauze bandages, etc. A system of training trainmen by

proper instruction, by proper instructors, will be inaugurated, based on the deductions as taught by Bowditch Morton, M. D., in the hand book issued by authority of the Society for Instruction in First Aid to the Injured. Each conductor and engineer and baggage master of our system will be first thoroughly instructed; and, after they have become proficient, all trainmen will be taught. Proper examinations will be held in this branch of knowledge the same as in every other department of road instruction. Each man now entering the employ of the company is examined physically and his mental qualifications noted. I will be happy to take up further any matter that will add to the improvement of, or care of, the injured, and I regard First Aid as the most humane and important of all the steps leading toward happy results in our field of labor."

The chief clerk of the Plant system of railways writes: "Upon this system there is an organization known as the Plant System Relief and Hospital Department, organized through the co-operation of the company and its employes. This organization provides stretchers for about every ten miles of railroad operated, and has a surgeon for about every twenty miles of its line, who is provided with a complete surgical outfit, and all necessary bandages. In addition to this the railway company provides an hospital car, fully equipped, which can be carried to the scene of a wreck with a full corps of surgeons and nurses, who are on duty in the various hospitals belonging to the department day and night. In view of these ample arrangements we have found it unnecessary to give any special instructions to employes in the matter of First Aid. When this department was first organized it was attempted to provide emergency bags at certain points and place them in charge of competent employes, but upon experience we found that the average American railroad man was entirely too experimental and would insist on trying experiments unknown to modern surgeons, to the detriment of the patient. For this reason they were discontinued, and we only issue very simple instructions. For your further information I enclose you a copy of our book of regulations and book of instructions to surgical and medical staff, from which you will doubtless observe that the injured persons on this system are adequately provided for." The book referred to does not give any First Aid instructions.

The assistant to the general manager of the Southern Railway enclosed copy of hand book, on page 30 of which, he says, will be found a list of surgeons and points where stretchers for moving injured persons are located, and on pages 32 and 34 are to be found rules for employing surgeons, medical directions to employes in case of accident and list of hospital districts.

The hand book gives plain directions for the administration of laudanum to relieve pain, how to treat a fracture or a case of bleeding, burns or scalds, and gives some practical instructions with regard to the use of stimulants and how to move a patient.

The superintendent of the Terre Haute Railroad says that "all crews, freight and passenger, are provided with folding stretchers, also with a kit of material for First Aid to the injured, which includes splints, tourniquet, absorbant cotton, gauze, rolls of bandages, bi-chloride of mercury tablets, and so on. So far as educating our men is concerned, we expect very shortly to have our chief surgeon and others give them some instruction."

[The bi-chloride of mercury, or corrosive sublimate, which is often placed in emergency boxes, forms, when dissolved in water, one of the best antiseptic solutions known, and is invaluable when used to cleanse a wound. Taken internally it is a deadly poison.]

The general superintendent of the Toledo and Ohio Central Railway replying to the Digest, says: "We have two or three of our largest yards equipped with emergency surgical cases containing material and instructions to cover this point. We have under consideration the equipment of cabooses in a similar way."

The general superintendent of the Toronto, Hamilton and Buffalo Railway says: "We have an association called the Railway Hospital Association, to which all employes in train service and the majority of employes in other departments belong. In connection with the association emergency boxes are used, containing, with instructions for use, 1 tourniquet, 1 can bi-carbonate of soda, 1 bottle aromatic spirits of ammonia, 1 box carbolic ointment, 1 roll rubber plaster, 6 cotton roller bandages, 1 piece cotton cloth, 1 piece cotton cloth for sling, 2 packages absorbent cotton, 1 pickage absorbent lint, 1 package surgical lint, 1 pair scissors, 1 package pins, 2 splints, 13½ inches long, and 1 sponge. One of these boxes is placed in each baggage car and caboose, also at each terminal or other important station on the line. The boxes are kept under seal, and when it is necessary to use them, and the seal is broken, they are exchanged at Hamilton for another box, the one with broken seal being sent to the hospital association to be refilled and re-sealed. Once every year a series of lectures are given by Dr. G. S. Rennie, our surgeon-in-chief, who is also physician and surgeon to the Railway Hospital Association. These lectures are given at such times as will enable all employes on day and night duty to be present. We have found this to be an excellent system, as it insures intelligent assistance until such time as the injured can be placed under the care of a competent physician."

The chief surgeon of the Wabash Railway Employes' Hospital Association in reply, remarks: "Our road is somewhat differently situated from most roads in this respect—that at three different places we have fully equipped hospitals of our own. In addition to these hospitals we have at the larger towns and cities dispensaries with a full supply of drugs, surgical dressings and appliances. At these hospitals and dispensaries there are salaried surgeons whose time is almost exclusively given to our work. Further than this we have at every station where switching is done, and at many other little towns, where there is hardly any local work, local surgeons stationed. These gentlemen are closely and conveniently located and are subject to our call at any hour of the day or night. We have at one time tried the utility of having a First Aid box or package on every train, but I am compelled to say that these did not prove to be successful. They were not cared for properly, and the supplies were used for very minor injuries, and trouble was not taken to have them replaced. I have been in charge of the medical service of the Wabash Railroad for the past ten or twelve years, and I cannot remember but one case where death resulted from lack of quick attention. This one case was seen by one of our local surgeons within a few minutes after the injury, but he did not succeed in controlling the hemorrhage."

The general superintendent of the Wisconsin Central Railway writes that "each baggage car and caboose on this line is supplied with a medicine case equipped with the necessary medicines, bandages, etc., with circular of instructions pasted on the cover of each box." The circular contains brief directions as to the care of injured persons, pending the arrival of a physician.

British Business Methods

New Zealand wanted some locomotives, and ordered them in England of an eminent firm. The eminent firm said it would be happy to supply them of a certain pattern and a certain weight. The railway authorities thereupon pointed out that the weight was too much for the bridges, which were already constructed. The eminent firm said that they were sorry, and recommended that the bridges should be rebuilt.

Higher Speeds and Punctuality

The directors of the London, Brighton & South Coast Railway, some years ago, decided to reduce the running time of some main line trains, the idea being that the engines could not make time, as the trains were uniformly late. Mr. Stroudley, the locomotive superintendent, however, advised that the time be made still shorter and not longer on these trains, as he maintained the engines were quite capable of performing the accelerated service. The time card was accordingly made pretty "stiff," with the result that the trains were on time.

BOGIE TRUCKS FOR ELECTRIC RAILWAY CARS—I

By George L. Fowler.

It has been remarked from time to time that the electric roads are gradually swinging into the line of practice followed, in the various departments, by the steam surface roads. The managements of these roads are either drawn from the personnel of the steam roads, or they are learning that the old methods of operation in the days when the horse was the motive power, will not suffice for present conditions. Track and equipment are both now constructed on a basis of substantiality that would have put many a regular railroad to shame a few years ago.

In no one particular has this been more marked than in the case of the development of the car and the track. Thirteen years ago, when electric railroading was in the swaddling-clothes days of infancy, the promoters of that method of traction were compelled to offer to equip the horse-car, as it stood, with electric motors; so very reluctant were the railroad men to even consider any changes that would involve an increase of weight in car body or running gear. Of course, such makeshifts were failures and the light cars that answered well when propelled by horses, were soon racked and destroyed by the electric motors, with which they were fitted.

It soon became very evident that a truck was needed, and various designs were soon offered on the market. Then it was found that longer cars with a larger capacity than the old horse car could be economically used. So the length was gradually increased until the bogie truck became a necessity.

Owing to the conditions of the service, it is very desirable that the car floor should be as low as possible in order to facilitate the free movement of the passengers in and out. It has, therefore, been the practice to keep the framing well down over the wheels and allow the minimum of clearance over the latter. The bogie truck, as used upon ordinary passenger cars, has been adapted for this service and is extensively used. There are necessarily some modification from steam railroad practice and it is to these modifications that it is proposed to call attention in this article.

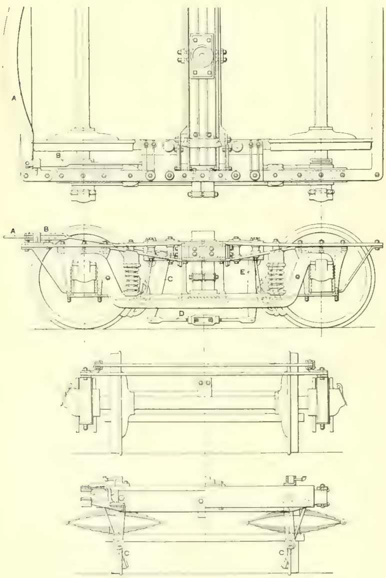


FIG I.—INTER-URBAN TRUCK, BUILT BY THE BARNEY & SMITH CO.

Let us take as an example the bogie truck shown in Fig. 1, and which is built by the Barney & Smith Car Company, of Dayton, Ohio. Here we have a truck identical so far as design goes, with many that are in use upon steam roads. It may be remarked, however, that the builders of trucks for electric cars have not been hampered in their use of materials, as in the case of their older confreres. There was a clean, fresh start, and the use of wood has been tabooed in almost every instance, from the beginning.

In the truck under consideration there is a rectangular frame, made of 1-in. by 3-in. metal, and sprung up along the center of the sides to form a sort of upper arch bar or compression member of a truss between the pedestals. The lower bar or tension member is lighter than the upper, and the two are firmly bolted together at the pedestals and also at the center, a separating casting being used at the latter point. Each transom is formed of two pieces of ¾-in. by 7-in. metal, set on edge and in contact with each other at the center; being separated at their ends by an offset in the outer piece to take in the upper end of the spring plank hanger. The ends of these bars are firmly bolted to the casting at the center of the side frame already alluded to.

This truck still shows the traces of the old practice in that the spring plank is of wood and the bolster is of the flitch plate type. The hangers are also somewhat longer than those commonly used at the present day. Elliptic springs are used under the bolster and the two-bar equalizer carries the frame through helical springs in the ordinary way.

In the designing of tracks for electric cars, the motor is a matter of the first consideration. It is a bulky and heavy piece of mechanism that requires about all of the free space that can be obtained on the truck. The result is that the brake rigging must be fitted about it in any way that may be possible; for the motor builders apparently never make the slightest attempt to allow for this necessary appendage. In this truck there are no brake beams and the pull rods are run just inside the wheel line.

The system of levers is easily followed. At one end of the truck there is a yoke A, over the center of which a traveler rides that carries the pull from the brake staff or cylinder. At each end of this yoke there is the pull rod B leading to the brake lever C, and from this the connection D runs to the dead lever E. In this way all of the brakes are interfulcrumed and an equal pressure is put upon each shoe.

Such a truck is better adapted for use on interurban than strictly urban roads. The 33-in. wheels are those of a standard car and the height of the center plate is such as to raise the car body higher above the rails than is desired for ordinary street service.

A modification of this form of truck is shown in Fig. 2, which represents one that is built by the Jackson & Sharp Co., of Washington, Del. In this there is not a solid rectangular frame, and the wheel pieces are channels to which the pedestals are bolted. The truck is held squarely in alignment by the transoms and end pieces. The latter are of wood and also serve as a sort of fender. They are held by a stiff piece of flat metal bolted between the flanges of the wheel piece and attached by a brace to the top of the wooden fender. This piece of metal runs the whole

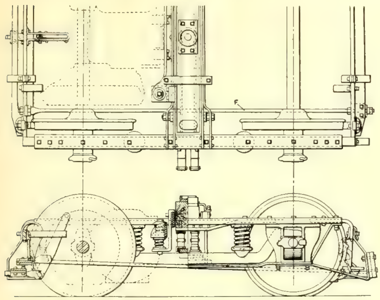


FIG. 2.—MOTOR TRUCK, BUILT BY JACKSON & SHARP CO.

length of the truck, dropping down at the center to form a shallow truss to assist in carrying weights on the transoms. These metals on the two sides are also fastened together by a flat bar set on edge and running across the truck. The bottom of the fender is braced against the foot of the pedestal, and these latter are strengthened by tie-bars in the usual manner.

The transoms are the same as in the truck shown in Fig. 1, and the bolster is made entirely of wood, which is carried on elliptic springs. The hangers for the spring plank are long links with a slight outward inclination. The equalizer is of the single bar type and, as in Fig. 1, it carries the frame on helical springs in the manner usual on passenger cars.

As in the first truck the whole space between the wheels is left clear for the motors. Brake-beams are, however used. Power is applied to the upper end of the brake lever tending to move it away from the center of the track. The lower end is attached to one brake-beam and thus moves it with its shoes toward the wheels. The intermediate connection bears against a cross equalizer to the ends of which the pull rods F F are attached. They extend to the other brake-beam and serve to draw its shoes against the wheels.

This truck is also especially adapted for high speed and heavy service and is built very closely along the lines of the steam railway truck; the principal difference being that the frame of this one is of steel, instead of wood. In service it gives perfect satisfaction and is extensively used under the cars of the Chicago Elevated Railway, as well as on the underground roads of London.

These two trucks have all of the characteristics of the steam road trucks and there is no reason why they should not, as they are designed for identically the same class of service. Modifications are, however, required for the general run of electric service and one of the most important of these is the lowering of the car body.

This lowering is quite possible, even with 33-in. wheels, as will appear from Fig. 3. This is a truck also built by the Barney J. Smith Company, and differs radically from the first one described. In the first place, we find that the side frame consists of two flat bars set on edge and bolted to pedestal castings that set over the old boxes. The ends of the frames are tied together by a piece of ¾-in. by 4½-in. flat metal, that is bent out to clear the wheels, thus forming a goose-neck that, of course, materially lessens its efficiency as a strut. The transoms are also of flat metal, and they, too, have an off-set, so as to span a heavy casting upon which the bolster rests.

The bolster is of a type that is more common in body bolsters than in those of the truck on steam roads. It is low shaped and is made of two pieces of ⅝-in. by 8-in. flat metal. The ends rest upon a bracket formed on the inner face of the large casting G, on the top of which are the the side bearings.

The spring suspension is peculiar, but is of a general type that is extensively used in electric railroad service. There is a single semi-elliptic spring on each side that is supported at the center on the side frames. The ends of this semi-elliptic carry hangers, that drop down through helical springs, taking hold of a spring seat H, upon which ends of these springs carry the casting G, upon which the bolster rests. The latter is, therefore, spring supported with almost the same efficiency as in the cases of Figs. 1 and 2. In the former there are a set of helical and semi-elliptic springs between it and the wheels. In Figs. 1 and 2 there is a full elliptic instead of the semi-elliptic.

The brake rigging is constructed on the same lines as in Fig. 1.

In this truck we find the first representation of the motor support for carrying the nose of the same. This is a plain flat bar, with a quarter twist at each end, where it is set on the springs I. A bolt passes down through the seat beneath the spring J, and thus the support is spring cushioned in both directions. The spring I prevents it from going down and J from rising. Such a provision is necessary in order to prevent injury to the motor from the jars to which it would otherwise be subjected. The brackets against which these springs bear are bolted to the transoms.

The last truck (Fig. 3) departs somewhat from the regulation pattern of the steam roads, and it will be found that this difference will be greater still in others that are to follow. In Fig. 4 there is shown a truck made by the McGuire Manufacturing Company, of Chicago, Ill., that is entirely unlike anything in steam service, in that the frame is made in one solid steel casing, including the transoms. This is certainly a very novel feature of truck construction and serves to reduce the number of parts to a minimum. The metal is put into I sections, so as to obtain

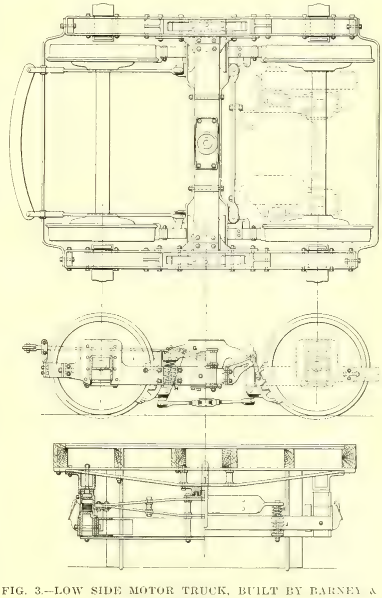


FIG. 3.—LOW SIDE MOTOR TRUCK, BUILT BY BARNEY & SMITH CO.

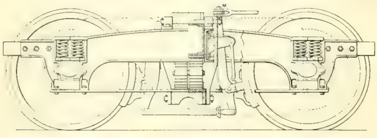


FIG. 4.—BROOKLYN "L" TYPE, SOLID STEEL TRUCK, BY THE McGUIRE MFG. CO.

both vertical and horizontal strength. Here, too, we find the nest of pedestal springs that have become so common in freight work. A nest of four light springs is used instead of the double spring that must be made of heavy metal to carry the load. In addition to the pedestal springs the bolster is carried by a nest of elliptics at each end, that, in turn, rest on a spring-plank swung by long hangers from the top of the transoms.

The brake rigging somewhat resembles that used by the Barney & Smith Co. There is a yoke bar at the end with a traveler, so that the truck can swing through a wide range on rounding curves without interfering with the action of the brake. From each end of this yoke pull rods run to a cross bar, M, which is pivoted to the upper end of brake levers at each side. These levers then apply the brake in the same way as in the case of the trucks shown in Figs. 1 and 2.

Another truck made by the McGuire Manufacturing Company is shown in Fig. 5. This has a solid cast steel frame like Fig. 4, and differs from it principally in the fact that the bolster is carried on the spring-plank by both helical and elliptic springs and in the arangement of the brake rigging.

This rigging consists of a rocker arm K, to which the lever L is keyed. This rocker is pivoted at the ends in

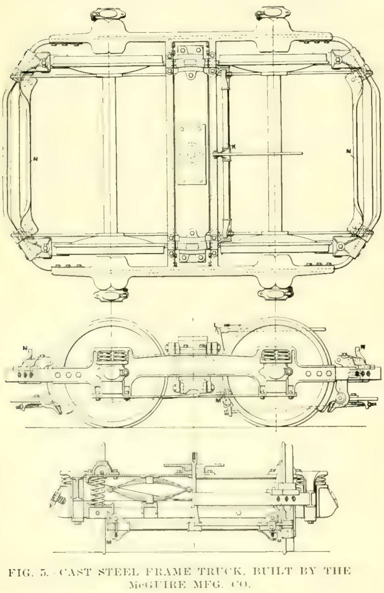


FIG. 5.—CAST STEEL FRAME TRUCK, BUILT BY THE McGUIRE MFG. CO.

a casting bolted to the transoms and also has keyed to it, close to its bearings, a clip M, which forms a lever arm projecting up and down, to which the pull rods for the brake beams are attached, respectively. As the lever L is moved in the direction of the arrow, the shoes will be pressed against the wheels. It will be noticed that these brake shoes are not interfulcrumed, but that the pressure exerted by each shoes is dependent upon the relative wear of the set. This is a feature of electric railroad practice that is quite common, and which is not to be found in the regular practice of steam roads in America. The motor support in the bar V, is of a similar character to that shown in the Barney & Smith truck of Fig. 3, although the arrangement of the springs is slightly different. Here there is a spring on each side of the motor support, with a bolt running down through the whole system and attaching it to the frame. In this way

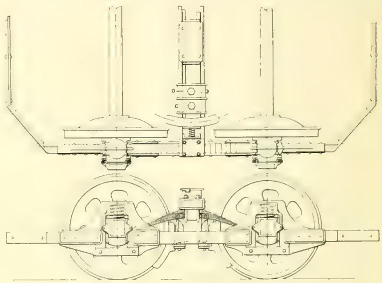


FIG. 6.—MOTOR TRUCK, BUILT BY THE BEMIS CAR BOX CO.

the upper spring prevents an upward and the lower a downward movement of the nose of the motor.

In Fig. 6 we have a truck built by the Bemis Car Box Company, of Springfield, Mass. This truck is exceedingly light and has a combination of three sets of springs, between the car body and the wheels. The bolster is formed of two flat plates set on edge and carried by a casting at the end, which rests upon two helical springs. These springs are carried by two bolts, whose heads rest on the casting O, that is, in turn, supported on the transoms.

The transoms extend out between the wheels and are held to the band of a semi-elliptic spring, whose ends have a bearing on the side framing. This side framing consists of two bars of flat metal, riveted to pedestal castings and is carried by helical axle-box springs. The truck is held in alignment by extensions of the frames that are carried out and across the end of the truck.

(*To be continued*)

A Brake that Works

The public is indebted to the London *Daily Mail* for introducing through its Geneva correspondent an engineer who is credited with an invention of a "mechanical brake," which stops a train that is running at fifty miles an hour within a distance of twenty yards. Good! But what about the passengers? A train running at the rate of fifty miles an hour covers 73 1-3 ft. in one second; and to stop a train moving at this speed in twenty yards means that it must be brought to a full stop in four-fifths of a second. When we remember that in an end-on collision it takes several seconds for the momentum of the train to expend itself in telescoping car into car, one is moved to ask what would be the condition of the living contents of a passenger car that was brought to a stop in the fraction of the time that it takes to bring the last car of a telescoping train to rest.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Cost of London Fog

Canadian Electrical News (Toronto), April, 1901, p. 61.

A London fog is an expensive visitation. A day of it, counting the day at eight hours, is estimated to cost anything from £50,000 to £100,000 in hard cash. No small proportion of this goes to the gas and electric light companies, which have to supply about a third more power than usual. But there are also the railways. Fog signalling is expensive. At Clapham Junction alone £50 has been spent by a single railway company during a day's fog in extra pay to the platelayers (trackman).

Moving Stairway at Liverpool

Railway Herald (London), April 20, 1901, p. 7.

The Liverpool Overhead Railway has recently opened a moving stairway to the public at the Seaforth station. It consists of wooden treads running on "hemacite" wheels on a rail fixed to a steel framework. On each tread are strips of wood faced with india rubber, which affords footing for the passengers. The elevator runs at a continuous speed of 100 ft. per minute, and lands the passenger at the top without inconvenience or danger. At the top the passenger may step to the stationary plank, or his feet are landed safely by an ingenious device. A moving hand-rail is another feature of the stairway. The machine is absolutely noiseless. The carrying capacity is 3,500 passengers per hour.

[The Manhattan Elevated Railway in New York has a similar piece of mechanism called an "Escalator," placed at the 23d street and Sixth avenue station.—Eds. Railroad Digest.]

European and American Bridge Building Practice

Engineering Magazine, April, 1901, p. 43

Mr. Thomas C. Clark gives reasons why American bridge builders have distanced their competitors in foreign fields. He says Americans are twenty years in advance of other nations—except Canada—in the art of bridge design and construction. In the first place, steel is now made in the United States at much less cost than in any other country. This country has, it is estimated, 190,000 miles of railway and about 36,000 metal bridges on existing lines, or one span to every three miles of road. The increased weight of engines and cars, and the increased weight of load in each has necessitated within recent years an enormous number of renewals, to say nothing of new bridges for new roads. This demand has by a natural consequence brought into the field a number of bridge building firms with large plants, having the most modern equipment that money can buy. The competition among these home builders has been very keen, but it has been fair and open, every one knowing what everyone else was doing. The use of standard sizes, shapes and connections; designing, having in view the complete machine-making of all points; admirable shop methods and rapid and cheap erection, these things, the result of strenuous home competition, has made the American bridge builder facile princeps when he found himself in competition with foreign rivals.

It has been a frequent complaint in the English press that the sections of metal called for by their engineers are unusual and not kept in stock. They complain that details are often so complicated that duplication is impossible. They also complain that economy of time in erection is not duly considered. The foreign engineer, with some notable exceptions, is somewhat isolated in his own office, and solves each problem by requiring strength and durability only, and without much attention to the use of such details as ensure economy of construction and rapidity of erection. The English bridge engineer in his own country has not had such a wide field for his operations as his American cousin has in his, and the former has not been subjected to anything like the same stress in competition at home.

[The American bridge engineer and builder has made himself very skillful in the game as played at home, and has had the co-operation of the steel maker and the engineer of the purchasing company, his doings have been freely made public, and it has resulted in a species of "team play," which is always a strong winning combination.—Eds. Railroad Digest.]

Smoke in Railway Tunnels

Engineering (London), March 29 1901, p. 418.

Smoke in railway tunnels is always annoying, and in long tunnels with double tracks it becomes a serious matter. The Hoosac Tunnel, in the western part of Massachusetts, is 4.71 miles long, and is kept free from smoke by the use of two large ventilating shafts. The Cascade Tunnel on the Great Northern Railway, in the northwestern part of the United States, was opened recently and the difficulties with smoke are of a serious nature. The tunnel is 13,500 feet in length, and the easterly portal is 500 feet higher than the westerly one. This difference in elevation induces a strong easterly draught throughout the tunnel so that trains running in a westerly direction are unusually free from annoyance by smoke, but on trains going in an easterly direction it is just the contrary. The heavy grade of 200 feet to the mile requires, on the heavier trains, a pair of locomotives, and the smoke from them has greatly annoyed the trainmen and firemen, several of whom have left the road on account of severe asphyxiation. This condition of affairs is to be remedied by using electric locomotives, which will also operate for a short distance on either end of the tunnel. Thus, a section of 7.5 miles will be operated by electricity. The water flowing from the tunnel will be conducted into a deep valley and wil be utilized for driving turbines to operate the electric generators which will furnish the section with power. For many years the railroad tunnel under the city of Baltimore has been operated by electric locomotives, proving a boon both to passengers and trainmen.

Canadian Rails for the I. C. R.

Railway and Shipping World (Toronto), April, 1901, p. 113.

In the Canadian House of Commons on April 10th, in committee of supply on railway and canal estimates, the Hon. A. G. Blair, Minister of Railways and Canals, explained that the Intercolonial Railway was being re-railed. During the past year 75 miles of the line in Cape Breton had been done. There had been some scarcity of labor so that the whole road in the island could not be completed. Last year rails had been purchased from the Illinois Steel Company and the Cambria Co. at $32.60 a ton. The arrangement for this year is that the rails will be supplied by the Sault Ste. Marie Manufacturing Co. Mr. Blair said that the ores of this company were of a superior quality and the steel made from them would contain a percentage of nickel. This, while it did not form an element in the price, would add materially to the durability of the rails.

[The Toronto World refers to this company as the Sault Ste Marie Power Company, of which Mr. F. H. Clergue is president. The contract is said to be for 25,000 tons of steel rails at $32.50 per ton.—Eds. Railroad Digest.]

Rails

Railway and Engineering Review, March, 16, 1901, p. 149.

The committee report to the American Railway Engineering and Maintenance-of-Way Association, shows that the American Society sections are in use on about 83 out of 127 roads reporting. Very few roads are using the 65 lb. rail and in future its use will be generally dispensed with. No road uses the 95 lb. rails. In regard to sections other than the American Society, there are thirty-six weights given. The figures given indicate that five different weights of rail ought to cover the requirements of all the railroads, as follows: 60, 70, 80, 90 and 100 lbs.

A study of the maximum axle loads in use on the different cars indicates that for the present and future very few roads will require the light rail, and a large number will require 80 or 90 lb. rails.

The flange will probably have to be increased on account of the change of finishing temperature or rails, and the section will be modified by providing additional metal in the flange. About 90 per cent. of the railroad mileage is either straight tracks or with curves less than 2 degrees, leaving less than 10 per cent. of the track where there might be extra flange wear on account of curves. Therefore, no special sections for the special conditions of 10 per cent. of the track will be suggested, but the standard will be made to conform with the other 90 per cent.

The committee recommended that the minimum standard length of rails be made 33 ft. and that 5 per cent. of the order be accepted in shorter lengths, the minimum length being 27½ ft.

The committee further recommended that the minimum standard length of cars be made 33 ft.

How to Study the History of a Rail

Railroad Gazette, April 5, 1901, p. 231.

Mr. F. A. Bryan, Assistant Engineer of the Michigan Central R. R., in a communication to the Gazette describes a method for obtaining a section of the rail while in the track, which he does not claim to be a new idea, but which he has used successfully. A mold as in Figs. 1 and 2 is made

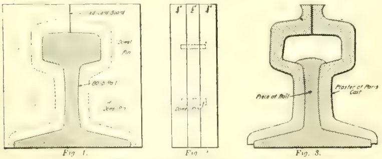


Fig. 1. Fig. Fig. 3.

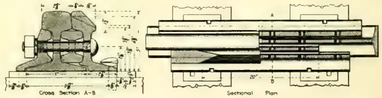
Device for Taking the Profile of Worn Rails.

of soft pine so as to fit over a new section of rail. This is clamped over the rail and plaster of paris is then poured and allowed to set. When removed from the mold the casts are placed against a thin piece of new rail of same section as that measured, but with the head removed, and the head of the desired rail is then traced as in Fig. 3. The accuracy of this tracing depends upon whether or not there has been any change in the dimensions of the web and base. They will generally not be different from the new section. Then the web and base can be calipered and a correction made when making the drawing, or a mold can be made so as to permit the taking of a cast of the entire rail. To keep the plaster of paris from cleaving to the mold or rail, the inside of the mold should be varnished and the rail, after being thoroughly cleaned, should be oiled. Dental plaster should be used, mixed thin and thoroughly beaten to remove all air; it is then poured the same as molten metal. The openings between the rail and the mold are closed with putty or moistened clay so that the plaster may not escape.

The Barschall Rail Joint on the Pennsylvania

Engineering News, April 4, 1901, p.254.

The Pennsylvania Railroad has lately been trying the Barschall rail joint, which comes to this country from Europe well recommended. The accompanying illustration shows the details of the joint, which differs from those in use here, in that it depends upon an independent auxiliary rail to carry the wheels over the rail joints instead of upon a stiff spliced connection alone. As yet the Pennsylvania Company has furnished no record of its experience with the new joint. Mr. Charles Barschall, of the Barschall Impregnating Co., of New York City, writes in effect to Engineering News as follows: European experience has shown that the only joint that will prevent hammering is the Barschall rail joint. The observations of nine years show its superiority and the warm recommendations of Prussian engineers have so impressed the minds of American railroad officials that they are willing to give it a trial. In the Barschall joint the rolled section of the outer rail has a running surface which sets closer to the main rail. The



Cross Section A-B Sectional Plan

increasing of the efficiency of the rail joint will be solved by practical service. The rail ends must be protected by the running surface of the outer rail at the point where they now begin to be hammered down. Some have made the claim that new wheels will be supported by the main rail only and not by the outer rail. The limit of independent movement of the two supports is easily seen with joints applied to rails with hammered ends. The wheels will be supported by the outer and the main rail, if the latter has not been hammered down beyond the limit of the independent movement; if it has the outer rail will carry the load alone over the joint, and protect the ends until the maximum wear of the entire length of the rail is obtained. If in some cases of badly worn tires the false flanges should cause a perceptible shock, it is surely no objection in comparison to all wheels hammering on all joints. This doing away of hammering is a great saving on rolling stock, and large immediate savings can be made by equipping rails, with hammered ends, with this joint instead of renewing the rails.

A New Pile-Driver

Scientific American, April 13, 1901, p. 232.

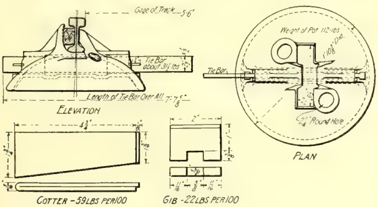
Mr. Willies E. Smith, an engineer of the Chicago, Milwaukee & St. Paul Railway, has recently patented a machine which can be used in maintenance of bridges and other

road department work. A pile-driver is carried on a 45-foot car, two extra truss rods being used. The transoms of the truck extend beneath the outer sill of the car body, and to the top of the transoms is secured a heavy plate carrying a jack screw; the latter can be turned up against the car sill to prevent side-tipping. In order that the pile-driver may be coupled to any train the leaders are so proportioned that they do not project beyond the car when lowered, and the driving deck itself is 16 feet 8 inches above the top of the rail. By means of a capstan connected by chain gearing with a sheave at the center of the driving deck a vertical shaft is operated, provided with a pinion which engages with a rack along the side of one of the center car sills. Thus the driving deck is moved. To raise and lower the leaders a pair of quadrant lockers are used. As they pass from a horizontal to a vertical position they roll on the deck and elevate the leaders, which are supported at the apex of a four-cornered tower 20 feet above the deck. Two legs of the tower consist of a pair of angles over the front corner of the deck and an oblique ladder behind. The pile-driver can drive piles in all places and under all conditions encountered in railway service.

Cast Iron Ties

Railway and Engineering Review, April 6, 1901, p. 237.

There is on the Madras Railway 1,046 miles of main line and siding laid with cast iron bowl sleepers. The total number of these now in use is estimated at 3,318,427, and the renewals for the past two years average 2.88 miles, or 9,135 per annum, which is .275 per cent. renewed per annum. Cast iron bowl sleepers were first laid in 1861 and are now 40 years in use. The heaviest engines are 6-coupled freight with a wheel base of 15¼ feet, carrying 14½ tons on each axle, and a total load of 73¼ tons. Mr. W. E. Stoney, chief



engineer, states that these cast iron bowl sleepers joined with wrought iron tie rods, make an excellent road. They must, however, be tamped with good clean sand ballast. The rails are of the bullhead pattern, 30 feet long, and the sleepers are spaced 2½ feet centres at the joints which are "suspension," and 3 feet 2 2-3 inches centres at intermediate parts of the rail. The bowls are placed with open mouth downwards. They weigh about 112 pounds, and the tie bar, which is 2½x½ wrought iron, weighing about 31½ pounds, stands upright on edge and is held firmly in place by keys driven through, one on each side of each bowl. The gauge is therefore preserved intact.

Machinery for Driving Tie Plates

Railway and Engineering Review, March 16, 1901, p. 148.

The Review details the old ways of laying tie plates, and then says: "We recently found two instances where a machine, built on the principle of a pile driver on a small scale, is used for embedding tie plates. One of these is in service on the M. C. R., having been designed by Mr. M. Sullivan, roadmaster at Niles, Mich. The machine consists of a light pair of leads hinged to sills placed upon an ordinary push-car and pivoted to swing to working position over either rail. Under the leads of the driver a heavy piece of forked steel is placed, this is known as the driving tool or "straddler." The hammer weighs 100 lbs., and consists of a cast iron weight with a wide and thick wrought iron strap shrunk around it to fit the grooves in the leads and provide a striking face on the bottom. The plates are applied by removing the spikes from a short stretch of rail and placing the plates in position and then following with the driver, which is alternately swung from side to side into position over each plate as the car advances. The machine is handled by two men. When it is desired to remove it from the track the leads may be made to fall backward on hinges by disconnecting the braces which secure them in the upright position. The other driver belongs to the Southern Pacific and is similar though heavier in construction. It was designed by Mr. J. T. Mahl, engineer maintenance of way of the Atlantic Division of that road.

Uniformity of Colored Signals

Railroad Gazette, April 5, 1901, p. 240.

The Railroad Gazette editorially comments on the last meeting of the Railway Signalling Club, which, it says, was marked with the usual unprofitable results. In speaking of yellow, some members seemed to mean a light yellow and others a dark one. An objection to the use of yellow is that greens and reds are variable, and under certain circumstances, yellow looks like a shade of these. This, the Gazette continues, can be remedied by making the glasses uniform. The only rational standard is to have a deep red uniform in all signals. Uniformity is of equal importance in green signals. This will cost a little more, but the advantages are so manifold as to warrant it. Another objection is that an engineman when used to seeing yellow distant signals which look like red home signals, will sometimes reach a home signal (without seeing the distant) and believing it to be the distant, make no effort to stop before passing it. The Gazette meets this objection with plain facts. English railroads with ten or a hundred times as many signals as there are here, have for many years made their distant signal and home signal night colors exactly alike, and they have had no trouble. Of all the accidents investigated by the British Board of Trade, not one was due to such a cause. In the face of this, such discussions as the above seem, in the judgment of the Gazette, to be decidedly academic.

Dangerous Signal Lights

Railway and Locomotive Engineering, April, 1901, p. 163.

It is not unusual to find signal and switch lamps with white lenses or bull's-eye glasses in all sides, and a thin sheet of colored glass which gives the distinguishing caution or danger color to the signal, located close to the flame Being close to the flame this thin sheet of glass may break. If broken, it usually drops below the flame level and allows the lamp to show a white light, when safety demands that a colored one should be displayed. If the colored glass is part of the lens and breaks, the flame of the lamp is likely to smoke badly or be blown out, and so give no signal where a signal should be, which is of course taken to be equivalent to a danger signal. Locomotive Engineering thinks that the standard code should make white lights no signal at all. The thin, loose, colored glass may be cheap, but it is not safe, and not being safe its cheapness does not represent economy.

Fire Protection by Water Curtain

Franklin Institute Journal, April, 1901, p. 312.

The Journal of the Franklin Institute credits the Iron Age with saying that the "water curtain" as a means of fire protection is growing in favor, and that the Chicago Public Library is so protected. The arrangement is thus described: A 7-inch steel water main is laid around the top of the structure, upon the broad stone table formed by the top of the coping, this pipe having connection with force pumps situated in the basement, and though perforations properly arranged insures the introduction of a substantial sheet of water from cornice to pavement, around the whole or any

imperiled portion of the building. The system of piping is so arranged as to permit of operating in prescribed sections; additional relays of smaller pipe are also placed in positions above windows and doors in order to complete the curtaining of those points in the most serviceable manner should the curtain in the main be broken by wind impinging against the building.

[This method might be applicable for the protection of valuable stations or other important railway buildings.—Eds. Railroad Digest.]

Locomotive Equipment, Appliances and Related Matters

Traction Increasers not New

American Engineer and Railroad Journal, April, 1901, p. 121.

Mr. James M. Boon writes to the Engineer to say that a locomotive traction increaser was patented by Mr. M. W. Baldwin somewhere about 1848-9. This traction increaser was part of the equipment of an express passenger engine with a pair of single drivers, and a pair of carrying wheels, just in front of the drivers, and behind the engine truck. It consisted of a toggle joint, with a long lever projecting up into the cab. The joint was bolted to the frame and connected with the back end of the equalizer. By pulling the lever back, part of the weight on the carrying wheels could be thrown on the drivers. Four engines of this kind were built. Two went to the Pennsylvania, one was sold to the Hudson River Railroad and one was bought by the Vermont Central. A line engraving accompanies the letter.

American Locomotives for South Africa

Engineering News, April 25, 1901, p. 298.

A number of locomotives have recently been built in this country for the Cape Government Railways, of Cape Colony, South Africa. Th gauge is 3 ft. 6 in., and the fuel is bituminous coal. The engines are thoroughly American in design, though several special features have been introduced to meet the requirements of the railway authorities. The radial-stayed fire-box is of copper plates, and has a fire-brick arch supported on angle irons. The foreign equipment includes the Gresham and Craven injectors and sanding gear, a 3-in. Ramsbottom safety valve, and link-and-pin couplers of a type very generally used in colonial service. The engine is fitted with a steam brake on two pairs of driving wheels, and the automatic vacuum brake on tender and for train. The boiler has an extension smoke-box, and the sand-boxes are placed at the ends of the running boards. These engines were built by the Schenectady Locomotive Works.

Importance of Record of Engine Failures

American Engineer and Railroad Journal, April, 1901, p. 109.

It is not long since 5,000 miles per month was satisfactory mileage for a passenger engine. Now it is often double that. The great increase in the volume of traffic makes it a serious matter to delay a train and there is also the cost of repairs and the loss of service of the engine while in the shop for repairs to be considered. A superintendent of motive power recently said that if he could do so he would build a locomotive all in one piece, because the liability of failure increased rapidly with the degree of complication. It is clear that inspection in the roundhouse must be most carefully done and that it must be extended to include everything about the locomotive. Inspectors discover many broken parts and if these are repaired or replaced without record, an excellent opportunity for improvement in the direction of reducing the difficulty is lost. Several years ago Mr. Quayle issued to the various master mechanics of the Chicago & Northwestern a series of blank forms upon which were printed in copying ink diagrams of eccentrics, straps, piston rods, axles, driving boxes and other parts specially likely to fail in service. These diagrams and blanks served as a record of the fracture, its character and location in each case being reported and indicated on the diagrams, and from them the drafting room secured most valuable information for guidance in increasing strength where it was most needed. The result after four or five years is pleasing, the number of parts failing having been greatly reduced as the points of weakness developed. For example, if a number of eccentric straps broke in the same or nearly the same way it was easy to locate the weakness and remedy it by the addition of material where it was necessary. The time may come when a record of engine failures will be considered unnecessary, but at present it is an unusual record which does not show more than five failures per locomotive per year as an average, a failure in this case meaning a breakdown on anything which will cause a delay of three minutes, which cannot be made up. Close inspection and comparative records have accomplished a great improvement on several roads where systematic efforts are being made.

Reversing with Brakes Applied

Railway and Locomotive Engineering, April, 1901, p. 170.

Mr. A. P. Payson writes to Locomotive Engineering as to the best means of stopping a fast moving train. He quotes Forney thus: "(1) Shut off steam. (2) If train has continuous brake, apply it with its full force. (3) Reverse and open the throttle and sand valves." Forney advocates the checking of the train's speed first, before reversing, on account of the danger of cylinder heads blowing out. Mr. Payson also quotes Cy Warman, who in the "Tales of an Engineer" advises substantially as Forney does. While Forney is a recognized authority, and Warman a practical railroader, both advocate reversing with the brakes applied. Yet, acording to Mr. Payson, to reverse an engine after setting brakes is not correct practice. The engineer of an up-to-date express train would say: "Either reverse, or set the air-brake; but don't do both, or you'll lock the wheels." Locomotive Engineering concurs in this, and goes on to say that the trials made by the Air-Brake Association in 1895 on the Nashville, Chattanooga & St. Louis Railway to ascertain, in a practical way, what would produce the quickest stop for a moving train, it was proved conclusively that the shortest possible stop could be made with the air-brake alone. Reversing the engine with brakes applied almost invariably locked the drivers, and skidded them. It mattered not in the trials whether the throttle was open or closed, or whether the cylinder cocks were left open, the drivers slid and the stop was prolonged each time the engine was reversed while brakes were on.

[At the time Mr. Forney wrote the words quoted, the use of driver brakes was not as prevalent as now. He was probably writing with the then normal conditions, in his mind, that of trains with or without continuous brakes, but the engines not braked.—Eds. Railroad Digest.]

Locomotive Classification

American Engineer and Railroad Journal (April, 1900), p. 119.

Mr. F. F. Gaines, Mechanical Engineer of the Lehigh Valley Railroad, writes the Engineer as follows:

"I have noticed lately several propositions for a system of classifying the different types of locomotives. I beg to submit another. It is of the following form:

$$\frac{10}{4}\ \frac{C}{74}\ \frac{20}{26}\ W.$$

At first sight this appears very complicated and long. On the other hand, familiarity with the key renders its complexity of form unobjectionable, and as it is really conveys a great deal of information beyond defining the type, its use and the memorizing of the key are worth the effort.

The first fraction, denotes the number of wheels—the numerator indicating the total number of wheels under the engine; the denominator the number of wheels under the leading truck. A yard engine having no leading truck would omit the denominator.

The second fraction, indicates two things—the numerator, the number of pairs of coupled or driving wheels; and the denominator, the diameter of the wheel centers in inches. The letters representing the number of pairs of coupled wheels may be selected arbitrarily. Those given below represent the practice of our road and at least one locomotive builder.

B - 1 pair coupled wheels,—C - 2 pairs coupled wheels, D - 3 pairs coupled wheels,—E - 4 pairs coupled wheels, F - 5 pairs coupled wheels,—G - 6 pairs coupled wheels.

The third fraction, also represents two things; the numerator, the diameter (or diameters in a compound) of cylinders in inches; the denominator, the length of stroke in inches.

The fourth part, or letter, represents the type of fire box.

I - a narrow box between the frames,

T - a narrow box on top of the frames,

C - a compromise box, exceeding the width of frames and above the wheels at this point, whether driving or trailing, and up to a width of 72 ins. W is a wide box above the wheels, and over 72 ins. wide.

The classification used above for illustration indicates what is at present termed an Atlantic Type engine with a four-wheel leading truck, 74-in. wheel centers, a 20 by 26-in. cylinder, and a firebox over 72 ins. wide.

The Pennsylvania R'd. class E-1, becomes $\frac{10}{4}\ \frac{C}{74}\ \frac{20\frac{1}{2}}{26}$ W.

The N. Y. C. & H. R. Atlantic type becomes $\frac{10}{4}\ \frac{C}{72}\ \frac{21}{26}$ W.

The C. & N. W. Atlantic type becomes $\frac{10}{4}\ \frac{C}{74}\ \frac{20}{26}$ C.

The B. & O. Comp. Atlantic type becomes $\frac{10}{4}\ \frac{C}{72}\ \frac{15\ \&\ 25}{30}$ C.

The C., B. & Q. Prairie Type becomes $\frac{10}{2}\ \frac{D}{58}\ \frac{19}{24}$ W.

Such a system would at a glance not only define the type of engine, but by indicating its leading dimensions, give some idea of its size and capacity.

Locomotive Classification

One system of locomotive classification which has been proposed is as follows:

It is to use the letter A for all engines without a truck; thus a four-wheel switcher is A 4, for six wheel A 6. The two-wheel truck would be letter B, and a mogul would be B 6, while a "Gladstone" of the London, Brighton & South Coast type would be 4 B. A decapod would be B5 and so on. Next, a four-wheel truck would be indicated by the letter C and a ten-wheeler would be C 6. In this system a Columbia is B 4 B, and one of Marshall's Lake Shore type is B 6 B. Atlantic type is C 4 B. The letter D would represent a six-wheel truck, and the Brooks double ender at the Chicago Exhibition would be B 6 D, while engine 624 on the C. P. R. would be C 6 C.

This system is easy and concise and clear either for speaking, writing or typewriting.

Classifying Locomotives

Railroad Gazette, April 19, 1901, p. 261.

An assistant engineer of the Bombay, Baroda & Central India Railway, writes to the Railroad Gazette on the subject of locomotive classification. He claims that the system he advocates is simple and clear. It is applicable to any kind of combination and is easy to write and to talk of. With him an eight-wheel engine of the bogie class would be thus represented, 2.2.0. Further information can be added, if necessary, by adding S or C for simple or compound and giving the number of cylinders. Thus, Webb's four-cylinder compound express engine would be described as Class 2.2.0. C 4. Another correspondent writing from Hanover, tells of a classification which he says prevails in Germany and is gaining favor throughout Europe. It is based on giving the number of coupled axles and total number of axles in fractional form: thus a bogie eight wheel engine would be be 2-4 P. L. and a consolidation 4-5 G. L. The letters P. L. and G. L. being abbreviations for Persowenzug and Guterzug Lokmotiv, as the case may be.

[The first method is practically Mr. Whyte's method, as it differs from his only in the fact that it takes notice of the wheels on one side only, while Mr. Whyte's notation includes the total wheels, in every case. The fractional method, if one may call it so, seems to have one disadvantage, at least, it does not distinguish the leading bogie wheels from the carrying wheels at the rear.—Eds. Railroad Digest.]

Narrow Gauge Locomotive

Revue Generale des Chemins de Fer (January, 1901), p. 88.

This locomotive is intended for service on a mining road in Transylvania, on which there are curves of 328 feet radius. It is carried on eight wheels, all coupled, fastened to the frames, but, for the sake of facilitating the rounding of curves of short radius, the front and back wheels are mounted on radial axles.

This radial action is obtained by the Klien Lindner system. Its principle consists in keying the wheels to a hollow axle or sleeve, within which there is an axle with a crank for attaching the side rods and which is firmly fastened in position in the frames. This coupled axle is connected by a spherical coupling to the sleeve, which is thus at liberty to adapt itself to the curves of the track. A strong key serves to maintain the proper rotative relation between the two.

The hollow axle has a play sufficient to permit it to move about ⅝ in. on each side of its normal position, it being brought back into that position on a straight track by springs. In order to control this radial action and render it symmetrical, the front and rear axles are connected on either side by a series of levers that draw the axles together on one side and separate them on the other, as the direction and amount of curvature may require.

New Engine Performance on the C., R. I. & P.

Railway and Engineering Review, April 13, 1901, p. 245.

The new Brooks "Chautauqua" type passenger locomotive on the Chicago, Rock Island & Pacific Ry., which was illustrated in last week's issue of the Review, made a very fast run this week between Davenport, Ia., and Chicago. The train consisted of seven coaches, and had been delayed. A distance of 119 miles was covered in 122 minutes, including two stops.

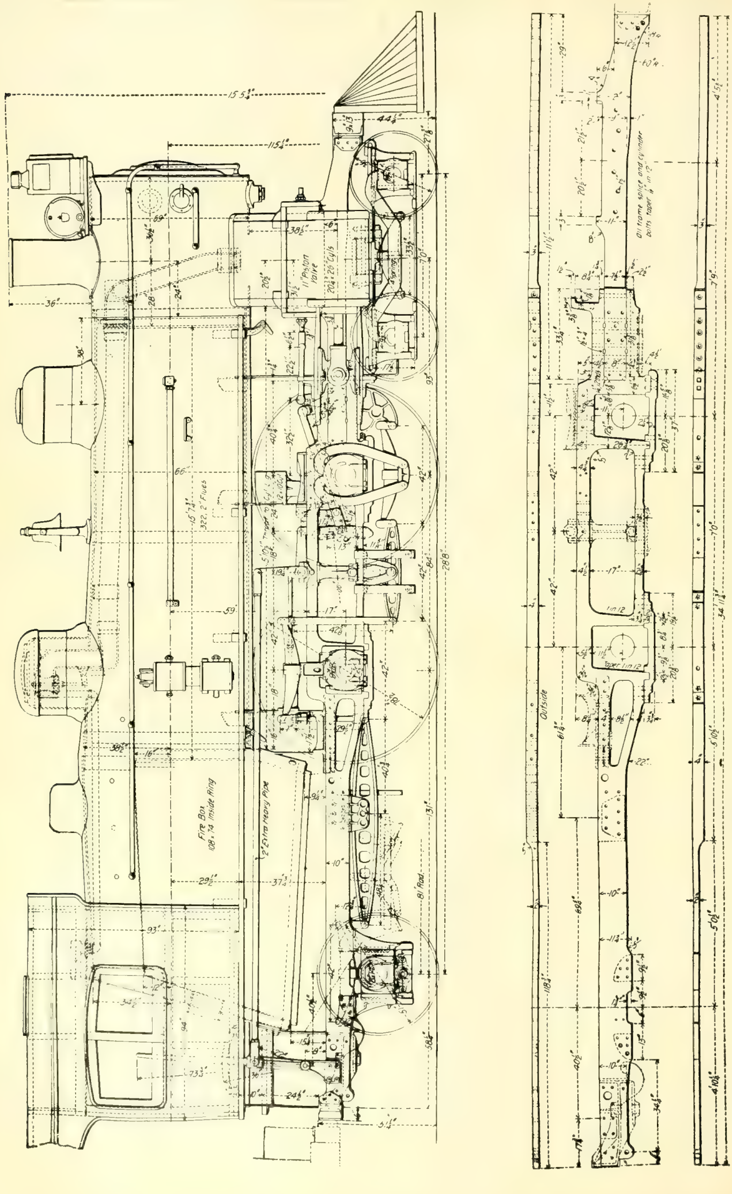
Speed of Express Train in Europe

Railroad Gazette, Feb. 8, 1901, p. 97.

The following is an excerpt from an article by Mr. W. Schulze which appeared in the Archiv fur Eisenbohnwesen, reprinted in the R. R. Gazette: "In England the fastest speed (54.5 miles per hour) is between Grantham and York, 83 miles; but runs of 120 miles, Bristol to London; 127 miles, London to Nottingham; 141 miles, Crewe to Carlisle; and 158 miles, London to Crewe, are made at speeds exceeding 50 miles.

FASTEST TRAIN SPEEDS IN EUROPE.

France	58.1	Sweden	35.5
Germany	51.1	Switzerland	34.6
Belgium	49.4	Servia	31.9
Holland	46.8	Spain	30.6
Austria-Hungary	45.5	Norway	28.1
Italy	41.7	Portugal	27.1
Russia	38.3	Turkey	26.3
Denmark	37.0	Bulgaria	21.9
Roumania	36.1	Greece	20.9



"Chautauqua" Type Passenger Locomotive—Chicago, Rock Island & Pacific Railway.

G. F. Wilson, *Superintendent Motive Power.*

Brooks Locomotive Works, *Builders.*

Fast Passenger Engine for the C. R. I. & P. R. R.

American Engineer and Railroad Journal, April, 1901, p. 101.

A noteworthy fast passenger locomotive has been built by the Brooks Locomotive Works for the Chicago, Rock Island & Pacific, which is called by the builders the "Chautauqua" type. This Rock Island engine includes several new features, such as box links, a new arrangement of the valve motion, a cast steel mud ring and a new form of ash pan openings. The Brooks radial trailer arrangement is used and the trailer journals are 8 by 4 ins. in size. The carrying wheels are 51 ins. in diameter.

A very direct and stiff valve motion is secured by the use of box links and straight connections with a parallel motion to pass the forward driving axle. As laid out, the slip of the links is very small and special care was taken to obtain square lead, port opening and cut-off. The side elevation illustrate the valve motion clearly. In the steam chests special efforts were made to obtain free passages for the steam to reach the valve ports; the exhaust passages are also large, the least area through the cylinder casting being 75 sq. ins. The effect of this is low back pressure.

The boiler, with curved crown sheet, is very high. Its center is 9 ft. 7¼ ins. above the rail. Plates at the front and back water legs support the back end of the boiler with no shoes or pads at the sides. The mud ring slopes to give a depth of 24 in. at the throat.

The frame arrangement is like that of an earlier design, with a single bar in front and with screwed bolts in the corners of the splice to prevent weaving.

A new design of ash-pan doors has been applied. The doors are self-closing by their own weight and are operated by a rotating shaft. The mechanism is equalized so that both doors will close together and it is arranged to provide for slight obstructions to the closing. Patents have been applied for on this ash pan arrangement.

Among the other details the following attract attention: Cast steel equalizers with three fulcrum points for those of the trailers; cast steel "grab hook" spring hangers; a combination of two fire doors in one as in the recent Lake Shore engines; extended valve rods for the piston valves, brakes on all wheels, including the truck and trailer wheels and Fox trucks under the tender. The driving wheels are 72½ ins. in diameter. The service on this road is severe in the number of stops required of fast and heavy trains.

Special Equipment.

Brakes	American for drivers, Westinghouse for tender
Sight-feed lubricator	Nathan
Safety valves	Ashton
Injectors	Nathan
Springs	Scott
Metallic packing, piston rods	Jerome
Metallic packing, valve stems	Brooks Locomotive Works

[This engine is called by the builders a "Chautauqua"; it is, by its wheel arrangement, an Atlantic or 4-4-2 type. In a certain sense this engine is possessed of a traction increaser, that is, the equalizers which connect the trailing springs with the carrying wheel springs, have each three fulcrum pin holes, so that, in the shop, by changing the pin, it is possible to alter the weights borne respectively by the trailing wheels and the carrying wheels.—Eds. Railroad Digest.]

The Knottingly Boiler Explosion

Engineering (London), April 5, 1901, p. 349.

The catastrophe which occurred on March 11th at Knottingly, on the Lancashire & Yorkshire Railway, has received considerable attention. After hearing much evidence the jury decided that the death of the driver and fireman was accidental; a rider followed, stating that the explosion was due to defective stays in the boiler. Owing to growing traffic Mr. Aspinwall, general manager, had designed and constructed several express passenger engines which were the largest and heaviest used at that time in England. They have been very successful. Similar boilers were used in the class of mineral engines, one of which exploded. The engine was running tender first up an incline and rounding a curve when the explosion took place. The fire-box gave way, the tearing beginning apparently at the left hand back corner. As the engine was practically a new one, it was not easy to ascertain the cause of the explosion. It obviously could not have been from corrosion or wasting of the plates. There remain then three hypotheses: first, shortness of water; second, that deposit had permitted the plates to become overheated; third, the stays gave way for some reason yet to be explained. The first theory appears to be consistent with the facts. There were three fusible plugs in the fire-box crown; they were placed diagonally across the box from the proper right hand front corner to the proper left hand back corner. As the engine ran round a curve the super-elevation of the outer rail, about 1½ inches, would throw the water off the left hand back corner where there was no plug. This would leave the centre plug bare, and it was found that the lead had melted out of this plug. The two remaining hypotheses were badly mixed up at the inquest. The relatives of the victims say that the boiler was badly designed, constructed and repaired. Facts elicited go to discredit bronze as a material for side stays. Several of the stays were found to have broken across in the thickness of the fire-box plate. The engine appears to have suffered from both leaky tubes and leaky stays and some caulking had been done, and it was suggested that the fracture of the stays was due to the bronze not taking the caulking kindly.

Mr. Seaton, a marine engineer, who gave evidence, did not accept the low water theory. He thought that the boiler on the whole was well constructed, but that these great engines were liable to leakage at the sides from the boiler being so very high and the supporting angles so low that the centre of gravity was further removed from the base angles than is usual. With engine oscillating the straining action is greater than usual, and that communicating itself to the sides of the fire-box the tendency would be to jar these stays apart. He thought that would be the predisposing cause of the accident, as the boiler being so high there would be greater leverage from the oscillation. Mr. Seaton also found fault with the design of the exploded boiler on the ground that the water space in the fire-box leg was too small for safety, it being about 2½ inches near the foundation ring. (The Engineer says, regarding this point, that the dimension is one commonly adopted in locomotive work.) Mr. Seaton's evidence is summarized by this paper when it says, he holds that it was the Westerfield explosion all over again.

[For G. W. R. locomotive boiler explosion at Westerfield see Digest, January, 1901, p. 19; also March, 1901, p. 101.—Eds. Railroad Digest.]

Boiler Explosion on the Lancashire & Yorkshire Ry.

Engineering (London), April 5, 1901, p. 450.

The engine in question was one of very modern type, having an exceptionally large boiler. Mr. Hoy, chief engineer to the L. & Y. Ry., gave evidence at the inquest to the effect that some 40 boilers of this type were at work on the line. Of these, four were in use in the Goole district, and these four had given considerable trouble in the way of leakage at the stays, while the other boilers had proved satisfactory. The stays which seem to have failed were not copper, but ferro-brass, the ingredients being 62 parts copper, 39 parts zinc and 6 parts iron. The theory put forward on behalf of the company attributed the failure to shortness of water. On the other hand Mr. A. E. Seaton, called on behalf of the Amalgamated Society of Railway Servants, though acknowledging that he had little experience in the matter of locomotives, attributed the accident to bad design, maintaining that the water spaces around the firebox were too small, the stays too widely spaced, that they were made of unsuitable material and were cut with a sharp-bottomed V-thread. Mr. W. G. Gibbons, of Goole, also gave evidence in support of Mr. Seaton's views. After the accident the railway company tested to destruction the boiler of another

Goole engine. The one tested had given more trouble than the one which had exploded, but in spite of this the pressure at failure was 485 pounds per square inch hydraulic, while the working steam pressure was 175 pounds. The evidence showed that the water at Goole was of a quality which caused much trouble with boilers. In view of the well-known ability and experience of those responsible for the design and construction of these boilers, the inquiry cannot be regarded as having afforded a complete explanation.

Boiler Explosion

National Engineer, April, 1901, p. 1.

On March 12, at about 8 o'clock in the morning, there occurred a boiler explosion at the Doremus Laundry in Chicago. The article describes the wreck of buildings and the loss of life, and says that as the wreckage was cleared away it was found that the boiler had been driven in all directions, the sheets being so badly torn that it was practically impossible to form anything like an intelligent estimate as to where the rupture started. The boiler was 60 inches in diameter and 16 feet in length, made of Ohio steel, 5-16 sheets, 7-16 heads. It contained 47 tubes, 4 inches in diameter. The longitudinal seams were double riveted, and the girth seams single. The boiler was originally built for the Board of Trade Building and had been used there for eleven years. The pressure was 100 lbs. A careful examination of the sheets and tubes, such as could be made, failed to reveal any indications of low water or burning. The nature of the explosion and the fact that the 5-16 sheets were torn like paper and showed no indication of crystallization, leads to the opinion that the explosion was caused by an excessive pressure and a sudden shock of some kind, like, for instance, the quick opening of a valve, which caused the water in the boiler to lift from the sheet. Apparently the steel was in as good condition as when first used. The engineer was generally known as a careful man, licensed under the city examiners, and the condition of the boiler, sheets and tubes, showing an entire absence of scale, pitting or corrosion, at least indicates that the boiler had been given good care. The casualties in this case were nine killed and 50 injured.

"Crowners Quest"

National Engineer, April, 1901, p. 19.

In an editorial on the Doremus laundry boiler explosion in Chicago, the National Engineer says: "The jury in the above mentioned explosion case was composed of one jeweler, one real estate dealer, one clothing salesman, one dyer, two tailors and the coroner and deputy, presumably physicians. By a fair estimate this jury would be able by three-eights to look into some case of mis-fit clothing, by one-eighth to fathom the mystery of a watch case, by two-eighths to estimate why a hospital patient passed away, by one-eighth to determine the lights and shades of dyed cloth or other material, and by one-eighth to settle the value of some swamp land or prospective city location. Having accounted for the eight-eighths, which constitute the whole, the part left, capable of investigating the cause of the explosion of a boiler, which was not constructed by tailors, colored by a dyer, fitted up by a clothing salesman, set in motion by a jeweler, operated by a real estate dealer, or cared for by two doctors; gives the actual worth of the jury in case in point. If a jury there must be, let it confine itself to determining the cause of the death of victims, without attempting to place the responsibility. Don't ask a boilermaker to determine the value or strength of seams in a coat, nor a tailor that of a steam boiler.

Stress on Boiler Tubes

Science and Industry (April, 1901), p. 118.

A recent explosion of a vertical watertube boiler in a rolling mill was caused by the tubes pulling out of one of the two cylindrical drums placed respectively at the top and bottom of the boiler. The writer admits that the explanation of how the stresses on these tubes can be calculated, which appeared in the "Locomotive," is the basis of his article. The reasoning employed is clearly expressed and is logical. It takes the reader along step by step, and shows him, with the aid of several figures, how to arrive at a satisfactory conclusion. The gist of the whole matter is that the pressure which tends to draw the header away from the tube, is the pressure on the header equal in area to the external diameter of the tube. See Fig. 1. A numeri-

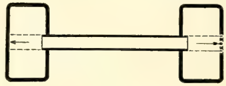


Fig. 1

cal example is given. A tube 4 inches in diameter is taken and a pressure of 125 pounds supposed. The pressure therefore, which tends to separate the header, is 1,572 pounds. (The area of a 4 inch circle is 12.57 square inches.) The President of the Hartford Steam Boiler Inspection and Insurance Company by some experiments found that tubes customarily used in water tube boilers and only expanded without being flared or beaded, did not draw out until the pull was from 5.000 to 7,000 pounds. Some other reason must therefore be given for the failure of such a boiler. Consider, for example, the arrangement of things shown at the right hand end of Fig. 2. Here is a bank of tubes opening into a box or drum, which was originally flat. The pressure

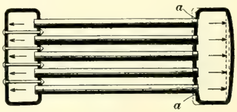


Fig. 2

acts against the right hand end and the head of the drum bulges out. If the tube sheet is not exceeding rigid it will yield somewhat to a severe pull like this, and it will tend to assume the form shown by the full lines. The result will be that the joints between the tubes and tube-sheet will be severely strained at the points marked a, a, and the tubes may even pull out at these points and give rise to a disastrous explosion. Trouble of this kind is increased if there is any over-heating of the tube-ends and consequent loosening of their holding power. The staying suggested in the left hand end obviously prevents the bulging represented at the right hand end. Science and Industry explains that its sketches are simply diagrammatic. The illustrations are not intended to resemble any particular sectional boiler, and the text of the article does not refer to any one make of boilers.

Theory in Boiler Repairs

Railway Master Mechanic, April, 1901, p. 103.

Observer contributes an article, with the heading given above. He says: The accompanying sketch shows the appearance of the back boiler head of an engine as it came into the shop for repairs. The row of staybolts, B, however, was not in the old plate.

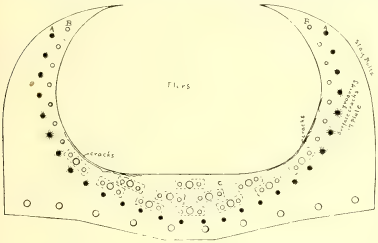
The cracks in the plate along the flange, and grooves along the staybolts, A, do not seem to be cracks that have affected the metal entirely through the plate, but are only surface fissures. The cracks were on the inside.

There have been several theories advanced as to the cause of the grooving about the staybolts, A. First, that the plate had been punched too large, and not sufficient metal reamed out after punching, so that the metal about the holes was tortured, thus causing these grooves to start. This is not at all likely to be the true theory, for this would not explain the cracks along the flange. Even if the metal had been tortured, this grooving must have been done by some other agent than steam and water acting on a tortured sheet.

The second theory is that the cracks may have been caused by galvanic action. This action, if such was the case, may have been produced by currents of water going ahead on one side of the boiler and back on the other. Mineral salts in the water may have aided this action, gradually eating away the plate. This also is probably not the true theory, for if it was, why should the plate be affected only along the flange and along the row of staybolts nearest the flange?

The third, and probably true, theory for the appearance of the plate is that it is due to the unequal expansion and contraction of the flues and boiler shell. As the fire is put in the fire-box, the fire-box and flues heat up before the boiler shell, and the flues expanding, put a severe strain on the flue sheets and staybolts until the water and boiler shell is heated to the same temperature, when the shell expands equally as much and so relieves sheets and staybolts.

The boiler shell being properly lagged, it is supposed to be exposed to the same temperature as the flues. When the fireman opens the door for any length of time, a current of cold air reduces the temperature of the fire-box and



flues at once, while the boiler shell, being in contact with the steam and water at former pressure, reduces its temperature only as the pressure sinks. Here again a strain is put upon the flue sheets and staybolts in the opposite direction, which will only be relieved when the pressure falls. When the fire door is closed the flues again heat up sooner than the boiler shell, and the strain is reversed on flue sheets and staybolts until the pressure rises sufficiently to expand the boiler shell again. As the staybolts B were not in the old plate, there was a space of six inches between the row of staybolts, A, and the old flue sheet. As the unequal expansion and contraction took place, the plate buckled over the staybolts A as a fulcrum thus injuring the metal about the staybolts and cracking the plate along the flange. This buckling process not only injured the plate, but loosened the staybolts and flues and caused trouble by leaking. The flange in the plate was turned too sharp, and thus cracks were invited. A new plate has been made with two improvements, which will probably do away these troubles. An extra row of staybolts B will sufficiently stiffen the plate, and a longer roll has been put in the flange, giving it more freedom to bend without cracking.

Manganese Bronze Staybolts

Revue Generale des Chemins de Fer (Paris, March, 1901, p. 248.

When the Northern Railway of France first put its boilers carrying 225 lbs. of steam into service, a great deal of difficulty was experienced by the breaking of the staybolts. A careful investigation was first made, in order to determine the location of the greatest number of breakages and then a remedy was sought. These breakages were located in the greatest numbers in the upper and forward end of the fire-boxes. To be more specific, they were spread through the three upper rows or in the side and back sheets, and also beneath the brick arch and following the angle of the same.

Up to the time of these investigations a stay-bolt, threaded over its whole length, had been used. The first move was to substitute for this one, with the threads cut away over the center. This produced no appreciable improvement.

The diameter of the bolts most likely to break was then increased, but as these breakages are generally due to the unequal expansion of the inner and outer sheets of the fire-box, the remedy was inefficient. In fact, it appears, when the matter is considered, that, with the form assumed by the staybolt, when there is an unequal expansion of the sheets, the larger the bolt the greater the stress to which it will be subjected.

Other remedies were applied in the form of different metals, especially iron and mild steel. Flattened bolts were also used, but to no avail. Tests of nickel steel gave no better results.

In April 1890 attention was called to the remarkable physical properties of manganese bronze. Certain recommendations led to the belief that it could be advantageously used for stay-bolts and an investigation in the physical laboratory of the road was begun. As the test was satisfactory, an order was issued for the application of these bolts in December, 1896.

At first the manganese bronze stay-bolts were substituted for the copper ones, previously used in the three upper horizontal rows in the side sheets of a high-speed compound locomotive. Then all broken stay-bolts were replaced by those of manganese bronze, and finally, in March, 1900, a fire-box was fitted entirely with this metal.

Since the first application, in December, 1896, about 3,500 manganese bronze stay-bolts have been put into service, the majority of which are located in those portions of the fire-box where they are most likely to break, without there having been a single breakage up to December, 1900.

In order to give some idea of the results obtained, it is stated that, during the first three months of 1897, the breakages of copper stay-bolts were at the rate of 543 per month; for the same period in 1898, they were 379; for 1899, they were 148, and finally, for 1900, they were reduced to 99.

The term "manganese bronze," however, is subject to some criticism, from the fact that it only contains from 4 to 5 per cent. of manganese.

British Locomotives

Cassier's Magazine, April, 1901, p. 449.

This article is from the pen of Mr. C. J. Bowen Cooke. He refers to an article in the London Times, which appeared last year. The fast passenger engines of the Philadelphia and Reading R. R. used in working the "Atlantic Flyer" between Camden and Atlantic City, which makes a run of 55½ miles in 50 minutes (or at a speed of 66 miles per hours are used as a basis of comparison. The writer says the Times' article would lead one to suppose that British locomotives are not capable of performing the work that has to be done in France or in the United States. The "Atlantic Flyer" engines are said to be able to make up time and travel at a speed of 70 miles per hour with a load of 230 tons behind them. Train speed is largely a question of piston speed. Between 1860 and 1870 a speed of 70 miles per hour was made by London and Northwestern engines of the "Lady of the Lake" type, pulling 120 ton trains.

The British locomotive engineer, unlike his American cousin, is limited in the size of the boiler he can build by the proximity of his down and up lines, the position of station platforms, and the width of tunnels on existing roads. The large outlay necessary to alter these things would hardly compensate for the slight increase in speed which may be had over what is now attained, in service. The British engineer may enlarge his cylinders but his difficulty is to get a boiler with the necessary capacity to supply them. He had therefore to turn his attention to compounding. The increasing weight of trains to be hauled, no doubt made Mr. Ivatt, locomotive superintendent of the Great Northern, say recently to the Institution of Civil Engineers "When a locomotive engineer made an engine that was capable of pulling a church, he was asked to hitch on the schools as well."

Webb's latest four-cylinder compound express passenger

PERFORMANCE OF MODERN BRITISH LOCOMOTIVES.

Railway	From	To	Distance	Minutes	Speed M. P. H.	Engine tons	Train tons	Total tons	Principal rising gradients and Remarks
London & South-Western	London	Southampton	79	98	48.4	89	288	377	6 mls., 1 in 249—10 mls., 1 in 298—10 mls., 1 in 388.
North-Eastern	York	Newcastle	80½	95	50.8	97	328	425	Long steady pull, chiefly up hill for about 50 mls. from York, but no long heavy gradients.
London & North-Western	Rugby	Crewe	75¼	85	53.1	81	333	414	Ruling gradient 1 in 330, long up to Whetmore from Stafford.
Midland	London	Nottingham	123½	143	51.8	99	177	276	4¾ mls., 1 in 176—4¾ mls., 1 in 166—3½ mls., 1 in 119—2 mls., 1 in 138.5.
Lancashire & Yorkshire	Leeds	Liverpool	85	102	50.0	89.8	200	...	Gradients are very heavy, 1 in 50 out of Leeds, 1 in 77 out of Manchester, and several gradients of 1 in 90.
Great Northern	York	Newark	68	80	51.0	92	323	415	Engines working this train have made several very good runs making up time.

engine "Iron Duke" on the L. & N. W. Ry. is spoken of as a particularly good example of the work turned out at Crewe. All the cylinders drive on the axle of the driving wheel. "At present," we are told, "forty of these engines are at work every one of which is double manned, is in steam six days of every week, and has a minimum of 316 miles cut out for its daily work. The North-Western compound engines are daily, without assistance, drawing loads of 333 tons behind tender at an average speed of 52 miles per hour." It is an undoubted fact that the Webb four-cylinder compounds are working the heaviest and fastest passenger trains in Great Britain, whilst the Glehn four-cylinder compound engines on the Chemin de Fer du Nord, in France are working the heaviest and fastest express passenger trains on the Continent. In the United States, the Atlantic type of four-cylinder compounds are hauling the fastest express trains in the world between Philadelphia and Atlantic City, although it should be borne in mind that these trains, while timed faster than any in Great Britain cannot come up to British trains in point of weight, —a very important factor in its relation to high speeds."

The article is illustrated with half-tones of thirteen types of British engines, and several tables, two of which we reproduce.

COMPARATIVE WEIGHT OF BRITISH TRAINS

Name of Road.	Weight Engine, tons.	Weight Train, tons.	Total Weight, tons.	Miles per hour
Lancashire & Yorkshire	89.8	200	289.8	50.0
North Eastern	97.0	328	425.0	50.8
Great Northern	92.0	323	415.0	51.0
London & North-Western	81.0	333	414.0	53.1

Locomotive Boiler Tubes

Locomotive Magazine (London), March, 1901, p. 53.

The tubes of a locomotive boiler have, by a process of evolution, arrived at their present dimensions. As materials for tubes, brass, copper, iron and steel have their advocates, but it is difficult to get actual practical competitive results of the behavior of each metal in service, every railway usually adopting one metal only, so that it is seldom that the chosen one is contrasted with another in the same service. According to good authorities, there is no appreciable difference in the evaporative efficiency of any of the metals, after a little scale has formed upon them. From trials made in France, some years ago, it was ascertained that when the diameter was 1 15-16 in. in diameter, the best evaporation was obtained with a length of 13 to 15 ft. When the number of tubes was reduced the production of steam was diminished, but the consumption of fuel was not much affected. With larger tubes steam production was augmented, the greater flue area allowing the products of combustion to escape more freely. This, however, reduced the heating surface, but the increase in evaporative power was considered to more than counterbalance this, and to justify the use of tubes 2⅛ in. outside diameter. Tubes of the "Serve" type, which have ribs formed inside them longitudinally, were found to reach their maximum efficiency at much shorter lengths, being from 6 ft. 6 in. to 8 ft. 3 in., but boilers fitted with ribbed tubes 3¾ in. in diameter and 11 ft. 5 in. to 13 ft. 2 in. long have been tried and have given good results in service. The average length of tube now being used in Great Britain, in large boilers, is about 10 ft. 6 in., with an average diameter of 1¾ in. Brass appears to be the metal most favored. Two arrangements of tubes may be made, some designers affecting vertical rows, while some prefer diagonal rows. Very little difference in steaming qualities has been observed between these two methods of arrangement. The vertical row system is the one usually adopted, as such an arrangement is supposed to allow a freer path for steam bubbles to rise. It has been noticed that when tubes in vertical rows are expanded, the tube plate will spread toward the sides, owing to the upsetting of the metal between tube holes, the diagonal arrangement spreads the plate more upwardly than sideways. It does not make much difference in what order tubes are expanded, but the best results appear to have been obtained by commencing at the bottom area, afterward doing one side, then the other, and finishing down the centre. When the tube is made of iron or steel, ferrules are considered unnecessary, but the ends of the tubes are swaged down about ⅛-in. less than the diameter of the middle of the tube and the holes in the copper tube plate are made to suit. Steel tubes appear to give good results, but they require careful treatment in working and firing or they will leak. Steel and iron tubes are gradually supplanting the more expensive brass and copper, and in America they are used without exception. The article concludes with a description of the various methods employed of setting tubes.

Effect of Boiler Scale

Railroad Gazette, April 5, 1901, p. 232.

Two letters appear in the Gazette regarding the effect of scale on boiler efficiency. Mr. W. S. Raidler, Master Mechanic of the Green Bay & Western, says that it is proved beyond a doubt by exhaustive tests that scale has very little effect on boiler efficiency. Locomotives frequently come into shops with a space between the tubes choked solid with scale, without any noticeable deteriorating effects. Scale deposits, however, carry with them a danger of mud burning. A coating of soot is not dangerous, but greatly impairs efficiency and capacity. What is far worse in every way is the inattention a locomotives receives as to cylinder packing, valves blowing, choked nozzles and double-flanged tires. The other letter is from Mr. W. H. Bryan, of St. Louis, Mo., and expresses substantially the same views as Mr. Raidler has put forward.

New Type of Water Tube Boiler

Iron and Steel Trades Journal (London), March 30, 1901, p. 367.

The conference at the Admiralty between the Admiralty Board and the engineer of the great ship-building firms of the country has not resulted in a definite decision on the water-tube boiler question, although it is understood that other boilers may yet be substituted in one of the cruisers of the "Drake" class of 30,000 i. h. p., and also in one of the "Cressys." The great success of the British torpedo destroyer "Vixen," in her speed trials on the Clyde, has directed the attention of shipbuilders to the new type of

water-tube boiler with which she is fitted. The "Vixen" steamed at a rate of 30.8 knots, or four-fifths of a knot above her contract speed with the engines running at a given number of revolutions per minute, her class of boilers is the "Express," a patent belonging to Vickers, Sons and Maxim, Limited. Amongst the great engineers who gave evidence before the Admiralty Board was Mr. James McKechnie, N. I. E., the engineering director of the Vickers' firm, and while it is not officially announced whether the latest type of water-tube boiler is to be given a trial in cruisers and battleships, the position of the board points to boilers of new design being fitted in the "King Alfred," of the "Drake" class, and the "Euryalus" of the "Cressy" class, both building at Vicker's yard at Barrow.

Duty on Locomotive Repairs

Railway and Engineering Review, March 30, 1901, p. 223.

The following questions were recently propounded at a session of the Canadian House of Commons: "Upon how many engines has the Wabash Railway Company paid duty on repairs during 1900? What were the numbers on each engine repaired? What were the repairs and the amount of duty paid the Government by the company for the year 1900 on engines repaired? Did the Government employ an expert mechanic to value the repairs and new parts supplied to the engines in order to arrive at the proper amount of duty to be paid? If not, what method was adopted? Did the Government or any member of the Government receive any complaint from any quarter regarding the Wabash Railway Company being allowed to repair its Canadian engines in the United States? If so, what was the nature of said complaints?" The Minister of Customs answered the questions as follows: "The Customs Department is advised that the Wabash Railway Company has paid duties on repairs to several engines during 1900. No complaint has been received at the Customs Department regarding the Wabash Railway Company being allowed to repair its Canadian engines in the United States, unless the following inquiries, contained in a letter from the member for East Elgin, can be so regarded, viz.: "Whether the Department of Customs has any agreement with the Wabash Railway Company which would give it the right to take its engines or other rolling stock over to its own shops in the United States for the purpose of repairs; and, if so, how does the Department of Customs arrive at the amount of duty (if any is paid) the company should pay on such repairs?"

Car Equipment, Appliances and Related Matters

Road Tests of Draft Gears

American Engineer and Railroad Journal, April, 1901, p. 115.

Road tests of draft gears were recently made on the Chicago division of the Atchison, Topeka & Santa Fe. They were made with empty and loaded cars. In the empty car tests the train was made up with twelve 80,000 lbs. capacity hopper coal cars fitted with Dayton draft gear followed by 35 hopper coal cars fitted with Miner draft gear. The results of these tests show the following. In tests 1 to 5, emergency applications were made at from 10 to 20 miles per hour. In No. 5 the brakes were cut out of the last six cars and the caboose. No. 6 was an emergency application at 20 miles per hour with brakes cut out of the last 12 cars and caboose. No. 7 was at 20 miles per hour, with 18 cars at the rear cut out. No. 8 was at the same speed, but with 24 cars and the caboose cut out. In No. 9 the brakes were cut out on the first 23 cars, also on the engine and tender. The engine pulled with wide open throttle and lever in full gear. At 10 miles an hour the angle cock on the caboose was opened wide, causing a violent emergency application on the last 24 cars and caboose. The train was brought to a standstill with the engine stalled. No. 10 was like the previous test except that the speed was 20 miles per hour. In No. 11 handbrakes were set up hard on the caboose and last 10 cars. The engine took the slack against them and started ahead, in full gear with wide open throttle. No. 12 was made with all brakes cut in. With the train moving at four miles per hour the engine was reversed to bunch the train and then the lever was put into full forward gear with the throttle wide open, causing the engine to plunge forward. This was followed by No. 13, which was an attempt by the engineman to break the train in any possible way. The results of all the tests showed that it was impossible to break the train in two. There was absolutely no damage to the cars, though the wooden sills showed splits from the corners of the key-ways. It was noticed in tests 7, 8, 9, and 10 that there was a good deal of recoil from the springs. In tests Nos. 9 and 10 the recoil was sufficient to pull the engine back several feet. However, the recoil was always gradual, elastic and free from all jerks, so that such treatment is not likely to cause any damage to draw gears.

LOADED CAR TESTS

The tests with loaded cars were made with two engines. No. 977 had 21 by 28 in. cylinders, 57-in. driving wheels and 200 lbs. steam pressure. No. 590 had 18 by 24 in. cylinders, 64-in. wheels and carried 180 lbs. steam pressure. The train was made up of 80,000-lbs. hopper cars loaded with coal, with the draft gear arranged as follows: 10 cars Miner, 2 cars Dayton, 16 cars Miner, 5 cars Dayton, 1 car Miner, 2 cars Dayton, 5 cars Miner, 1 car Dayton and finally the caboose. The gross weight of the train exclusive of the engines and caboose was 2,459 tons, but after two tests the load was reduced to 2,005 tons in order to come within the capacity of the engines. The remaining tests were as follows: No. 3, the brakes were cut out on the six rear cars and the caboose, an emergency application being made at 15 miles per hour. No. 4 was like No. 3, with the cutting out of 12 cars. In No. 5 the handbrakes were set on the last 10 cars and the caboose. Both engines took the slack against them and started forward in full gear, with wide open throttles. In No. 6 the angle cock was turned on the ninth car from the rear end and the hose uncoupled between the eighth and ninth cars, thus setting the brakes on the last eight cars. The engines attempted to start train with these brakes set, by taking the slack with the full power of both engines. This was repeated five times, the remaining test being a number of attempts by the engineers to break the train in two, in which they failed. With the exception of small cracks in the wooden sills, there was no damage to any of the draft gears, springs or couplers. Test No. 6 was exceptionally severe.

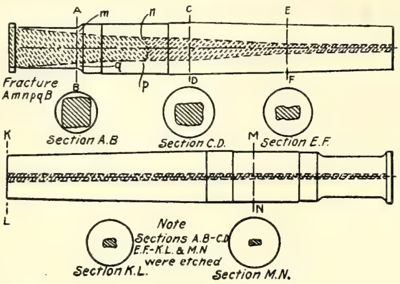
Specification for Steel Axles

Proceedings Western Railway Club, March, 1901, p. 360.

Mr. M. H. Wickhorst, engineer of tests of the Chicago-Burlington & Quincy, in a paper on steel axle specifications at the Western Railway Club meeting, displayed a broken axle which had failed because of segregation of material. Mr. Wickhorst said:

"As I see it, the most important thing to look after in inspecting steel axles is to insure that no crop ends of ingots have been used, and that no seriously segregated material gets into the axle. For this reason I do not think it proper to let the axles pass upon the heat analysis alone, but analysis should be made of borings taken from the end of the finished axle, so there may be some chance of getting hold of badly segregated axles, if there be any. The steel for axles is melted in open-hearth furnaces, cast into large ingots, and these are rolled down into square billets just large enough to satisfactorily make an axle of the desired size, and the chance for insufficient discard is very great.

To show how serious the segregation may be, I give sketch showing an axle which failed in service, and which was made from the piped end of an ingot. It will be noted that the failure consisted of the axle breaking at the junction of the journal and the wheel fit, and the journal in



coming off took along with it a tapered, oblong portion extending into the axle about 12 inches. The journal and this tapered piece consisted of the piped material from the upper end of the ingot, and etchings of sections from different portions of the axle showed this piped material to run all the way through the axle, being, however, at the end opposite the break, only a small portion in the center. The way this ran through the axle can be seen by the sketch presented, and also from the samples submitted."

The analysis of the broken axle gave the following results from borings taken from a section of the body of the axle just away from the end of the tapered portion which broke off, the borings having been taken from the center, and also close to the outside: Carbon, .09 outside, .10 center; phosphorus, .068 outside, .226 center; sulphur, .047 outside, .120 center, and manganese, .40 outside, .53 center.

Balancing Car Wheels

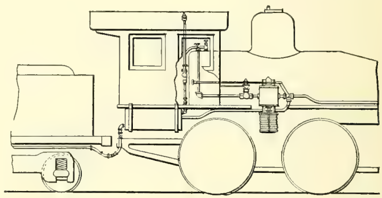
The Foundry (April 1901), p. 70.

At a recent meeting of the Central Railway Club Mr. Pemberton Smith described the method of balancing car wheels as practised by a New York car wheel works for the past ten years. He said that in the manufacture of each wheel small lugs are cast upon the plate between the arms or brackets on the flange side, each lug having a ¾-inch tapered hole formed by a core. The wheel is first bored and machined, and an expanding mandrel with projecting ends is then inserted in the bore and the wheel is rolled along parallelways. The force of gravity makes the heavy part take the lowest position, and the wheel is then turned 90 degrees, so that this heavy spot is on the horizontal diameter, and by means of a lever arm with sliding weights the exact amount that the wheel is out of balance is determined. If it is over 2 pounds for a wheel weighing 600 pounds the wheel is balanced as follows: Balancing blocks of different weights, indicated by figures cast upon them, are made to fit the brackets of the wheel and they are provided with a recess to fit over the lug and cored hole on the wheel above referred to, through which a rivet may be passed. A ¾-inch rivet, with one end at white heat, is then passed through the block wheel at a point directly opposite the heavy spot. The rivet is driven home, the heated end upset, and the balancing block is securely fastened in place. When the blocks are placed between the brackets or arms they are out of the way and can be firmly secured and held in position, the brackets preventing lateral motion and the rivets preventing vertical motion. After two to five years service the balancing block was found to be as tightly in place as when first applied. By this method nothing is done to impair the strength of the wheel.

Heating Trains with Air-Pump Exhaust

American Engineer and Railroad Journal (April, 1901), p. 129.

The Maine Central R. R. is using the air-pump exhaust to heat passenger trains. A three-way cock is attached to the exhaust pipe, immediately in front of the pump, operated from the cab. The two branches proceed from this three-way cock, one goes to the smoke-box in the usual way, and the other is connected to a carefully jacketed reservoir about 40″ long by 20″ in diameter, hung beneath the cab. The outlet pipe from this reservoir is at the rear end, near the bottom, and is connected to the train pipe by means of a flexible base. The pressure maintained in the reservoir is about 20 lbs for four cars or less and 4 lbs. additional for each extra car. On some 10-wheel engines on the Maine Central used in heavy passenger service a pressure of 65 pounds has been carried. The question naturally occurs: Is not the pump blocked by this disposition of its exhaust steam; and is there any trouble experienced in maintaining the proper pressure for the brakes? Formerly the only resistance the pump had to overcome was the main reservoir pressure of about 90 lbs. plus the friction. This added to, say 30 lbs. for heating a train



of six cars, would increase the resistance. With the common use of a boiler pressure of 200 pounds, this is reported to be a very easy matter. In order to maintain a constant pressure in the reservoir, an automatic relief valve is placed on top of the cab, and set at the desired maximum pressure. It is stated that there is no difficulty in maintaining the brake pressure, nor is there much, if any, difference in the time required to heat by this system and the ordinary method. No trouble is experienced in the quantity of steam supplied on local trains with many stops, as on such a train the pump is constantly working. On long through trains in zero weather it is sometimes necessary to supplement the exhaust steam from the pump with some drawn direct from the boiler. A pipe connection from boiler to reservoir is made, having on it a reducing valve, so that if the pressure in the reservoir sinks below that at which the reducing valve is set, steam from the boiler feeds in. It will be noticed that the live steam is only introduced to supplement that supplied by the pump, and in this way the economy due to the use of exhaust steam is maintained up to the full limit of the pump's capacity. The Economy Car Heating Company, of Portland, Me., is handling this device.

The Duty of the Hour for the M. C. B. Association

Engineering News, April 18, 1901, p. 284.

At the March meeting of the Western Railway Club Mr. S. P. Bush, Superintendent of Motive Power of the Chicago, Milwaukee and St. Paul Ry., spoke at some length in a critical vein of the Master Car Builders' Association, of which he is a most active member. He said the association should take some definite position with reference to car construction. For the last few years no new changes had been made. The association should be a potent factor in all that pertains to car construction. It would be an ex-

cellent time to adopt principles in car construction, as steel-car construction is just beginning. It is not necessary to discriminate against this or that special construction; but if railways are to interchange cars, as it generally done to-day, principles should be adopted with a view of obtaining construction that will be serviceable, economical to maintain, and which will make the operation of interchange and repairs for each other a simpler matter than it is to-day. The Engineering News remarks that the trend of the general criticism of the M. C. B. Association is that it attends too much to the minor details of construction and devotes too little attention to important matters concerning the general principle of design and construction of cars for modern conditions of operation. Although the steel car is now extensively used, the M. C. B. Association has given it little official attention. The News believes that the members would welcome the appointment of a strong committee at the next convention to consider the steel car question and eventually, perhaps, to report upon standards to be observed in the design and construction of such cars.

Special Steel Car

Railway and Engineering Review, April 20, 1901, p. 262.

The Northern Railway of France has a flat car for the transportation of very heavy pieces of machinery. The car is 46.13 ft. long over end sills, 8.53 ft. wide and 4.52 from top of rails to top of wooden decking at the ends. Its load designation is 70,000 lbs., and its light weight is 52,329 lbs. Tht framing consists of side and end sills, made of 12-in. channels. There are no intermediate sills, the drawgear engages with the body bolsters. The buffing shocks are taken up by the buffers at the corners after the usual European practice. The side sills from body bolster to body bolster are reinforced each by another channel. The side sills therefore between these points consist each of two channels set back to back with a space between. From body bolsters to end sills only single channels extend out on each side. There is no deck to this car, and as there are no intermediate or center sills the load, which is frequently pieces of machinery having large vertical dimensions, is carried below the level of the side sills, in which case the bottom of the load is 1.85 ft. above the rails. This is accomplished by suspending six transverse beams from bolts which pass up through the space between the back to back channels which form the side sills. These transverse beams can be shifted along the length of the car to suit the peculiarities of any special load, or can be removed altogether if desired. These transversals are further supported at their centres by straps, which extend from bolster to bolster, and also at their extremities by straps, which extend from end to end of the sub-deck space.

Woodcock Steel Hopper Car

American Engineer and Railroad Journal, April, 1901, p. 128.

The superstructure of this car is made entirely of standard rolled steel shapes and plates, the design being by Mr. W. H. Woodcock, Chief Engineer of Dutilh-Smith, McMillan & Company, of Philadelphia. Two channel side sills and two I-beam center sills with strong end sills of plate and angles constitute the underframe, the draft gear being placed between the center sills. With an approximate cubical capacity of 1,810 cubic feet the car is designed to carry a load of 105,000 pounds, the light weight being 36,980 pounds. The side plates, ridge and bottom plate are ¼ inch thick, weighing 10 pounds per foot. As a backbone there are two 15-inch I-beam center sills tied in the center with plates and four angles placed back to back and riveted to the webs of the channels. The end sills consist of ½-inch plates the full width of the frame, cut out at the center for the coupler shank. They are tied to the side and center sills by angle connections and gusset frames and are reinforced by angles riveted over and under. Special attention was given the end sills, with a view of making them stiff and strong. Several forms of hopper mechanism have been designed for this car. One employs chains for closing the doors and another uses toggles outside the doors. With the latter arrangement the doors cannot open or work loose when closed and they are easily operated by the mechanism. The top of the car is stiffened by 4 by 3-inch angles and by 4 by 2-inch verticals of T-section. The trucks are of the diamond type with Mr. Woodcock's special cast steel bolsters and malleable iron journal boxes. The designer has had a wide experience in the manufacture and testing of metals, both here and abroad, and has developed a patented alloy which is specified for the truck and body bolsters. Open hearth steel will be used which contains an alloy for the improvement of the physical qualities of the casting. By the use of this alloy the ultimate tensile strength is increased 30 per cent. and the castings are solid and free from mechanical defects. For the material of this car soft steel is specified with ultimate strength between 54,000 and 62,000 pounds, elastic limit, 50 per cent. of the ultimate strength, and an elongation of 25 per cent. in 8 inches. If basic open hearth steel is used for the plates the phosphorus must not exceed 0.035 per cent., and if acid, it must not exceed 0.08 per cent.

Box Cars with Steel Underframes

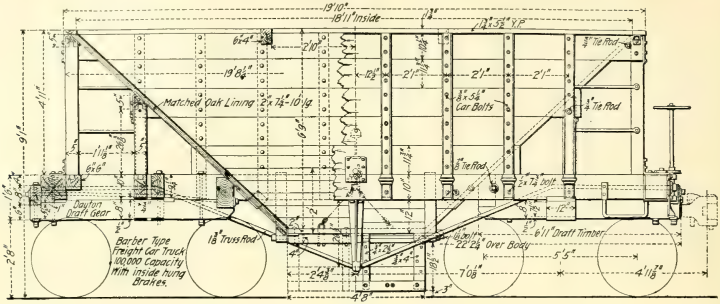
American Engineer and Railroad Journal, April, 1901, p. 107.

These cars, built by the Pressed Steel Car Company for the Union Pacific Railroad, have a capacity of 80,000 lbs. Steel is not entirely confined to the underframe. Pressed steel center and side sills of the "fish-bellied" pattern form the basis of the underframes, and, to these, pressed steel end sills are riveted, the draft gear being secured to the center sills and passing through the end sills. The draft rigging is the Pressed Steel Car Company's standard twin spring arrangement. Stiffening angles are riveted to the lower portions of the center and side sells extending a considerable distance each way from the centers. Pressed steel angles placed at 2 ft. 9½-in. centers, riveted between the webs of the center and side sills and the necessary bracing at the ends, complete the metal floor system. Three 4 x 3 in. wooden stringers each side of the center of the car, and additional stringers at the side sills form the basis for the floor and the box structure. Pressed steel U-section carlines with pressed sockets for the purlines are secured to the side plates, the plates being 8 x 3 ins. in section. A pressed steel angle extends along the outer upper corner of each side plate to form a secure attachment for the carlines. The posts and braces are 5 x 2½ ins., with diagonal rods, and the side door posts are 5 x 5⅛ ins. There are two 6 x ⅞ in. belt rails, and also one of pressed steel in U-section 4½ ins. deep. These cars also have 2 ft. x 2 ft. 11 in. end doors. Fox pressed steel trucks with 33 in. cast iron wheels, weighing 650 lbs., Buckeye couplers, with 6 x 6 in. shanks, cast iron journal boxes, pressed steel brake beams and Winslow roofs constitute the special equipment of these cars.

Passenger and Freight Trains

Railroad Gazette, April 5, 1901, p. 240.

The safety of a passenger train is so much sought after, because if there was some mishap, it would be far more costly to life and property than if it were to a freight train. Still accidents to freight trains are often very costly and and it is thought that better safe-guards should be used. A recent disaster in New Jersey, shows that one kind of freight train accident ought to be as thoroughly dealt with as if liable to befall a passenger train. The disaster mentioned, was a fire, spread by oil from broken tank cars, wich destroyed a number of buildings and resulted in a loss of many thousands of dollars. The cause was the failure of a draw-bar, or coupling, the separation of the train on a descending grade, and the subsequent collision. The remedy is to have all oil-tank cars equipped with air brakes.



Improved Ore Car

American Engineer and Railroad Journal, April, 1901, p. 125.

The Chicago, Milwaukee and St. Paul Railway has improved ore cars in use on the Lake Superior section. The latest one to be used is made of wood, carries 50 tons of ore, and weighs 29,300 pounds, a ratio of 77 per cent. of paying load. This is the highest ratio of paying load yet obtained in cars used for carrying ore. The arrangement of the centre opening of the hopper is entirely free for unloading. There is said to be no noticeable deflection of the sills when the car is loaded with 56 tons of ore. There is but one hopper, with the doors swinging sidewise and held by chains from a central shaft. The underframe is very "stocky" and strongly braced. There are but four through longitudinal sills, and four 1⅜ in. truss rods. These rods support malleable iron king post castings, which have wings bearing against the sloping sides of the hoppers; this takes a portion of the hopper load to the truss rods. Two ¾ x 3 in. hopper straps, a number of transverse rods, and two 4 x 6 in. cross beams tie the car across at the top of the box. A 25-pound I-beam at the center and a pair of 7 x 12-in. cross beams at the sills furnish lateral support at the bottom. The end supports of the box are upon 6 x 6 in. cross timbers, placed inside of the end sills. Draft timbers 7 ft. long are attached to 4½ x 10 in. strut sills, which are reinforced by tie rods, and the Dayton draft rigging is attached between the draft timbers. The bolsters are of the ordinary plate form, 12 ins. wide. The cars are equipped with Barber 50-ton trucks, inside hung brakes and Monarch brake beams. They are expected to withstand the roughest kind of service. The cubic capacity, level full, is 567.59 cubic feet.

Sanitary vs. Plush Cars

Toronto World (Toronto), April 13, 1901, p. 4.

The World finds that the Montreal Star has joined in the crusade against the so-called palace sleeping car. The palace sleeping car, with its gorgeous trappings, its vulgar over-doing, so to speak, has no attractions for men and women who are accustomed to travel, especially by night. What travelers want is a sanitary instead of a luxurious car. They would like to see the car builders and the car designers devote their energies to producing a clean, comfortable car, instead of the badly ventilated, badly heated and unsanitary long boxes in which the public have now to take refuge. A sanitary car will have no plush in it. All its woodwork will have a smooth varnished surface, which can be wiped off with a cloth. Its fittings will also be of some kind of varnished or enamelled work that can be cleaned very readily.

Wheel Flange Breakage

Railway and Engineering Review, April 20, 1901, p. 266.

The Review remarks that the flanges on the heavier class of freight cars do not break off in a horizontal line, but that the plane of fracture extends down from the flange fillet in an almost perpendicular line to the tread, making a whole section of the flange break off. It appears that the wheel could be strengthened by adding stock to that part of the flange which lies above the level of the rail. As the fractured part sometimes shows an initial seam at the flange fillet, a chance of improvement in the manufacture of wheels may be had by investigating the cause of these seams. The increase in flange breakage makes the strengthening of the flange a necessity.

Shop Practice, Machinery and Tools

Knapsack Paint Can

Master Painter, April, 1901, p. 9.

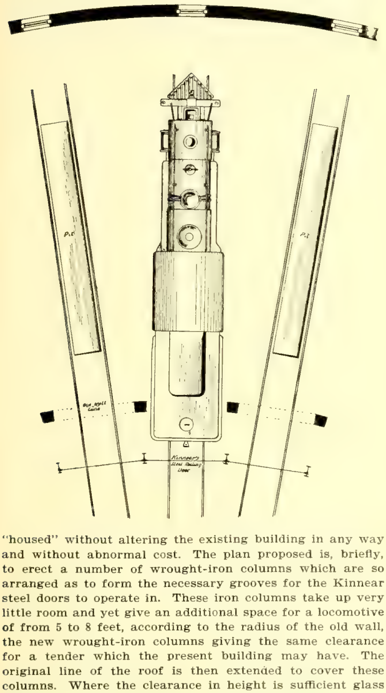
The engraving explains this device pretty well. A tube runs from the reservoir in the knapsack down through the paint brush handle, the reservoir being placed high enough

to force the paint by gravity into the brush. Valves are provided for regulating the flow of the paint. For use on ceilings a small rubber bulb may be used to increase the pressure inside the reservoir until the paint is forced to a higher level and feeds the brush as before. Nelson Stow, Binghamton, N. Y., invented the apparatus.

A Method of Round House Expansion

Railway Age, April 5, 1901, p. 409.

The large locomotives which have been built by many trunk lines of late years have in many cases taxed roundhouse accommodation to the utmost. In fact a modern locomotive in place on its pit in a roundhouse built some years ago, often has part of its tender extending outside the building. The Kinnear Mfg. Co., of Columbus, O., has devised an easy means by which a locomotive can be fully



"housed" without altering the existing building in any way and without abnormal cost. The plan proposed is, briefly, to erect a number of wrought-iron columns which are so arranged as to form the necessary grooves for the Kinnear steel doors to operate in. These iron columns take up very little room and yet give an additional space for a locomotive of from 5 to 8 feet, according to the radius of the old wall, the new wrought-iron columns giving the same clearance for a tender which the present building may have. The original line of the roof is then extended to cover these columns. Where the clearance in height is sufficient glass transoms can be placed above the doors to provide ample light.

Technical Publications

American Engineer and Railway Journal, March, 1901, p. 95.

The Engineer suggests that the drawing office would be a good place to have the technical publications systematically read. It says: "It should not be forgotten that these periodicals are prepared by men who spend all their time watching progress with a view of presenting new applications of old ones. It is worth while to suggest the advisability of appointing to a draftsman, or other subordinate, the duty of studying the current railroad literature with a view of guarding against the escape of an idea that might profitably be applied, but is now passed unnoticed because it is no one's special business to attend to it. This is one way in which the drafting room might be more helpful."

Chemistry in the Foundry

Engineering (London), April 5, 1901, p. 449.

The foundryman finds an advantage in the study of the chemistry of cast iron, since it not only enables him to secure definite results, but also to do so at the cheapest rate. By studying the chemistry of cast iron, the makers of the chilled car wheels have succeeded in securing a first-class article from ordinary coke-smelted iron in place of the expensive charcoal iron previously used. In fact, it was found that the most important point to be attended to, in producing a satisfactory chilled wheel was to keep the percentage of silicon less than 1 per cent. and more than ½ per cent. If more than the former limit the metal will not chill properly, while if the lower limit is passed the demarcation between the chilled and unchilled metal is so abrupt as to constitute a line of weakness, predisposing the wheels to fail under the application of the brakes. Equal success was found when malleable castings were made from cheap coke pigs, instead of the expensive charcoal iron.

Fire Extinguishers

Cassiers Magazine, April, 1901, p. 510.

Open pails and buckets filled with water have not yet been surpassed as "first aids" in fire fighting, and it is stated that more fires are annually put out by pails and buckets of water than by all other appliances put together. However, with all their utility they still are found wanting at times. Evaporation empties them slowly but surely, and borrowers generally forget to refill them; and workmen are apt to use them as wash-basins to remove the grime of the day, and in their haste to hurry home, they seldom think of replenishing the supply. To avoid such mishaps, the superintendent of a large mill adopted the following. The hooks from which the pails were suspended were fitted with pieces of spring steel strong enough to lift the pail when nearly empty, but not sufficiently so to lift a full pail. Just over each spring, in such a position as to be out of the way of the handle of the pail, was set a metal point, connected with a wire from an open circuit electric battery. So long as the pails were full, their weight, when hung on their hooks, kept the springs down, but as soon as one was removed, or had lost a considerable portion of its contents by evaporation or otherwise, the spring on its hook would rise, come in contact with the metal point, thus close a battery circuit and ring a bell in the manager's office, at the same time showing on an annunciator where the trouble was. As the bell would ring until the matters were set right, it was impossible to disregard the summons, and thereafter the condition of the waterbuckets was all that could be desired, in that mill.

The Nine-Hour Day

American Machinist, April 18, 1901, p. 423.

The International Association of Machinists is now agitating the nine-hour day question and is receiving the support not only of its members, but also of outsiders. The claim is made that the productive power of labor is now far greater than when the working day consisted of eleven or twelve hours, and that at nine hours it will be far more than it was a few years ago at ten hours, and also that this great productive capacity has greatly reduced the cost of work, while the workman is not better off, but perhaps he is worse off. The Machinist remarks that most employers are in favor of a nine or even an eight-hour day, but on account of the keen competition they do not see how it can be borne, unless all their competitors are put on the same basis. Desired reforms would easily be brought about if employers and workmen were united, but as such is not the case friction must result. Whether this friction will be useful or not, or whether it will leave the issue to be settled by a future struggle remains to be seen, but at any rate, if the men secure the nine-hour day it will be a good thing for the trade in more respects than one.

Metals as Fuel

American Machinist (April, 4, 1901), p. 363.

Sir W. Roberts-Austen recently delivered a lecture on metals as fuel at the Royal Institution, London. He said metals might be burned for the sake of the light and heat they produced. The use of magnesium for light is familiar and may greatly extend. A shell of magnesium might be fired, and the light from the burning metal be utilized in illumination for war purposes, for the placing of guns, etc. The use of metals as fuel assumed magnificent proportions in the hands of Sir Henry Bessemer. The Bessemer process of making steel was alone rendered possible by the burning of metals as fuel. In the case of aluminum burning in oxygen, combustion could be started by a minute fragment of charcoal. By experiments he demonstrated how beautifully the welding of metals could be effected by the oxidation of aluminum, remarking that it was impossible to foretel what in the future might not be accomplished by this process in the way of industrial art. The welding of steel rails for tramways had been successfully made by this process.

Electric Equipment, Machinery and Appliances

Remedies in Electric Shock Accidents

Electrical Review, (London), March 8, 1901, p. 433.

To guard against contingencies Mr. S. B. Cotterell, engineer and general manager of the Liverpool Overhead Railway Company, has had a list of "Precautionary Instructions" printed in leaflet form and circulated among the employes of the company.

Persons having to do with electrical appliances are advised to regard any apparatus with which they may have to deal as capable of affording shock, and to adopt precautions accordingly. When it is necessary for regulation or other purposes to touch parts of such apparatus when the current is active, the individual should be careful that his entire person is insulated from the earth, and from anything, other than the insulating medium, which connects with the earth. This may be best achieved by standing upon a rubber mat and using good, sound rubber gloves upon the hands. The importance of this precaution becomes apparent when one is called upon to rescue a man who becomes paralysed by the current and is unable to extricate himself. In such a case the first effort should be to switch off the current; failing that, to divert the current from the sufferer, and it is in this act that the rescuer should guard against the possibility of receiving shock himself. A piece of wire or an iron rod, if at hand, should be used temporarily to connect the live wire with the earth. If rubber gloves and mat be not available for the rescuer, he may use his jacket or coat or other piece of dry clothing to insulate his hands, or he may stand upon a dry board, dry clothing, a bundle of dry straw, hay, etc. He must protect his hands by interposing as many thicknesses of dry clothing between them and the sufferer, and in this way endeavor to withdraw or raise and insulate the sufferer from contact with the earth. If a man is receiving current through his person, between two wires or cables, the most ready means of help is to short-circuit the current outside the points of contact with the sufferer.

THE "LABORDE" SYSTEM

In cases where a man has received a serious shock and life appears to be extinct, efforts similar to those employed in cases of drowning should be made to restore animation. Recent experience has shown that the "Laborde" system has been very successful. The treatment is as follows: Lay the patient on his back in the open air. Remove his neck-cloth and unfasten his collar. Open his mouth, and taking hold of the front part of the tongue with your fingers—either bare or covered by a handkerchief—very slowly draw the tongue forward and as gently let it go back again 16 times to a minute. Be sure that the root of the tongue is acted upon and drawn forward. Continue this action until signs of re-animation are observable, which should be the case in from ten to twenty minutes. The motion thus imparted to the tongue should be regular and rythmical in both its tractions and relaxations.

If when beginning the operation, the jaws are closed open them by the finger or with a wedge-shaped piece of wood or the handle of a pocket knife. When operating upon the tongue the jaws should be kept wedged open. The rescuers' efforts should not be relaxed at the first appearance of re-animation; those efforts should be continued until there is sufficient indication that respiration by the patient can be carried on without artificial aid. The patient should then be sent to a hospital or his own home, placed in bed between blankets, and warm bottles applied to his feet. A little brandy may be administered as soon as the patient is able to swallow. It is of course understood that medical assistance should in all cases be sent for at the earliest possible moment.

ANOTHER SYSTEM

Lay the patient on his back in the open air. Remove his neck-cloth and unfasten his shirt. Make a roll of clothes, or anything at hand, and place it under his shoulders so as to support the spine and allow the head to fall downwards and backwards. Open the patient's mouth and draw out the tongue to free the throat. Then kneel behind the patient and grasp the elbows and draw them over his head so as to bring them together above it, and hold them so for some two seconds. Then carry them down to the sides and front of the chest, firmly compressing it. After two seconds repeat the action and continue it at the rate of 16 times per minute. This action expands the chest walls, causes air to rush into the lungs and finally expels it. The action must be regular and persisted in until respiration has become normal. It is possible that this may not be assured in less than an hour. If an assistant is at hand both systems may be employed, one man working the arms, the other the tongue, and both operating in unison.

[As to the time mentioned in these systems, there are some who hold that persistent efforts to induce respiration in cases of electric shock, or partial drowning, should not be given up for several hours if need be. One should not be discouraged if the patient takes a long time to recover.—Eds. Railroad Digest.]

Electric Lighting of Railroad Cars

Insurance Engineering, April, 1901, p. 81.

The question of a substitute for compressed gas, says Mr. F. H. Mason, U. S. Consul-General at Berlin, has been raised by the late accident at Offenbach-on-Main, where a rear-end collision caused the explosion of the gas tanks and the consequent loss of life by fire. The Stone system of electric lighting is being tried between Berlin and Cologne. In this system each car carries a small dynamo geared to the wheel axle and an accumulator, each being hung beneath the floor. The objection is that the varying speed and the stoppage of trains causes unsteadiness in the light which the accumulator does not always correct. It is also said that the accidents from gas explosions are so rare that in view of the cost and technical difficulties attending the substitution of electricity, experts are divided as to the wisdom or necessity of such a change.

The Father of Electrical Engineering

Science and Industry, April, 1901, p. 140.

We are now so familiar with dynamos and motors that few of us stop to think of the man who discovered the principles upon which they operate. If anybody enquires why it is that a dynamo generates an electromotive force, we reply that it is due to electromagnetic induction, and give very little thought as to who discovered the fact that a coil if moved so as to cut across a magnetic field has an electromotive force generated in it. This underlying principle of all dynamos or motors, whether direct or alternating, was

discovered by Michael Faraday in the year 1831. Faraday is now generally regarded as the founder of modern electrical engineering and rightly so, because to his discoveries we owe the most important applications of electricity. Michael Faraday was born in 1791 at Newington Butts, near London. He died in 1867. His parents were poor and he had very little education. He was apprenticed to a bookbinder, but afterwards obtained a position as assistant to Sir Humphrey Davy, and became connected with the Royal Institution in London, where he did most of his experimenting. He discovered practically all the important facts connected with the phenomenon which we call magnetic induction. It was known before his time that electricity could be made to set up magnetism, but the problem he solved was, could magnetism be made to set up electricity? After a great deal of experimenting he found that the magnet had to be moved relatively to the coil. This sounds simple enough, but nevertheless it was a discovery of the utmost importance. Faraday was a keen observer. He was not a mathematician, in fact it has been said that he had difficulty in performing simple operations in arithmetic. He was a brilliant lecturer on scientific subjects. He cared absolutely nothing for money and though tempting offers were made to him he preferred to remain at the Royal Institution on a small salary so that he could go on experimenting. "I have no time to make money," he would say. Faraday in his day was even more eminent as a chemist than as an electrician. He discovered the fundamental laws of electro-chemistry, and did a great deal of work in connection with the liquefaction of gases. After he had made his great discoveries in connection with induction he dropped the subject and left others to develop the dynamo as a commercial machine.

Miniature Portable Searchlight

Electrical World and Engineer, April 6, 1901, p. 557.

The portable searchlight illustrated herewith is manufactured by the Strobel & Wilken Company, 591 Broadway, New York. It is stated that the batteries do not deteriorate when not in use, and consequently the lights can be shipped long distances. It is stated that with ordinary use one set of batteries will last from four to six months. The searchlight is provided with an improved contact lever made

of tempered steel, and cannot get out of order. The case is covered with black leather with nickel-plated trimmings. It is 1⅝ inches in diameter and 8 inches long. It is, therefore, a compact and portable device. It is called by the makers the "Yankee Searchlight," and is recommended for the use of meter readers, sportsmen, doctors, tourists and all others requiring a temporary and satisfactory light.

[Could not this be arranged as a torch for a locomotive engineer?—Eds. Railroad Digest.]

Electric Theory of Hot Boxes

Railway and Locomotive Engineering, April, 1900, p. 160.

The "copper spot" on hot bearings has been responsible for a lot of theories regarding hot boxes. One of them, the electric theory, is beginning to attract attention. This assumes that all revolving bodies generate a current of electricity, which, if not properly handled, causes trouble somewhere. In the case of a revolving shaft or axle, it is assumed that the current generated will pass from shaft to bearing, and if any space exists between the two, as it is practically bound to do, unless the bearing is a perfect fit, an arc is formed. As the temperature of the arc is supposed to be 6,000 degrees, it is said that this is the reason that many bearings heat. The small size of the arc being the reason the temperature is not raised more rapidly in a bearing. Graphite, being nearly pure carbon, will evidently answer as a non-conductor; a film of oil, if continuous, would make a fairly good insulator. Bearings, which are described as "frozen" or "welded" to an axle (frequently twisting off the wheel) are claimed to be the result of these arcs. This is said to electroplate the axle from the bearing, although it might also be claimed that the heat of the arc fused the two together—for electroplating cannot be said to be done, sufficient to weld the coating on the metal to be plated. In the case of copper spots, however, there may be more of resemblance to electroplating, though a partial or isolated point of welding might be claimed. The solution of the problem would save many dollars to railways.

Multiplex Type Printing Telegraph

Consular Reports, April 1, 1901, p. 2.

According to the Cologne Gazette, the Baudot multiplex type-printing telegraph (a French invention) operates so excellently that the results in the Berlin and Paris line have surpassed all expectations. Since the main office has educated a sufficient number of operators for the Baudot apparatus, the system is now regularly in use during the greater part of the day. It has been demonstrated that the whole telegraph business between Berlin and Paris, which heretofore required five telegraph lines, can now be easily done over one, by means of the Baudot system. The operation is perfect and uninfluenced by minor interruptions of the conduit. The work for the operators is not more arduous than with the Hughes apparatus. It is to be regretted, says the writer, that the new system is not suitable for long cables, otherwise the German-English cable would profit by it at once. The new successes in quick and multiplex telegraphy will create a peculiar situation for the administration of the telegraphic service. If the Baudot system be introduced all over Germany, and, in addition, if the quick telegraph of Pollak and Virag be utilized for newspaper telegrams, and if Professor Slaby succeeds in applying his discoveries concerning multiplex-spark telegraphy to ordinary wires, then it will be only a question of a short time when the existing telegraph business will hardly keep all the lines busy.

Electric Rack Rail Locomotive

L'Electricien (Paris), April 6, 1901, p. 219.

Messrs. Brown, Boveri & Co. and the Swiss Locomotive Works at Winterthur, have just completed a combined rack and traction locomotive, to be used for working the heavy grades on the Lyons Western R. R., between Layone and St. Just. The weight of the locomotive is 12 tons, and it can haul trains of 28 tons up a 6 per cent. grade at a speed of 5.5 miles per hour, by adhesion alone, or up a 19 per cent. grade by the use of the rack. The driving mechanism for propulsion by rack and adhesion are entirely separate and distinct. Each locomotive is provided with several brakes; two screw brakes independent of each other and acting on the gear wheels; one screw brake acting on the driving wheels used for adhesive propulsion, and an automatic safety brake acting on the gear wheels when the speed exceeds a certain predetermined limit or when, for any reason, the current is accidentally interrupted.

Conducting Transportation

Rush Hours in the "Two-Penny Tube"

Railway Herald (London), March 2, 1901, p. 4.

The Central London Railway has already been compelled to take drastic measures to remedy the overcrowding which exists upon it. The overcrowding is confined to the two periods at the beginning and at the end of the working day. But already the company has been compelled to pro-

pose serious extensions. Practically the trains are to run around a circle, that is to say, they are not to be shunted back and forward, but are to travel always in a forward direction, round a loop at each terminal. The city loop will bring the railway into immediate contact with the Great Eastern Railway, and although it is likely to cost about £400,000, the directors hold that it will be remunerative within a short period. As for the Shepherd's Bush loop, it is estimated to cost about £50,000.

The train service by these measures will be made yet more rapid than it is at present, for it has been found that with the very smartest railwaymen at each end of the present railway, it takes 2 minutes and 50 seconds to do the shunting, and therefore, it is never possible to run more than about twenty trains in the hour. If, however, the loop is adopted, the only limit to the number of trains which can be run in the hour is the direct signalling arrangements on the loop.

Cabinet of Railroad Men

Toronto World (Toronto), April 20, 1901, p. 1.

It is stated in railroad circles that President Hays, of the Southern Pacific, is about to establish a radical change in the management of the system. He will form a cabinet of advisers, to be composed of the heads of practically all the principal departments of the road, with the single exception of the law department. The object of this cabinet arrangement is to centralize the authority and responsibility.

It is understood that the cabinet will have no authority to interfere with the president in any way, but the members will, in reality, be advisers to the president, who will be responsible only to the Board of Directors. It is also stated that Mr. H. E. Huntington will not accept re-election to the vice-presidency, but that he will continue to be a member of the cabinet.

Medical and Surgical Matters

First Aid on the Great Western

Transport (London), April 5, 1901, p. 274.

The directors and officers of the Great Western Railway have again shown practical sympathy with the work of the St. John Ambulance Association by awarding prizes to the best exponents of "first aid" methods among the members of their staff. The annual competitions have been held at the chief points on their system, and nine prize-winning teams will further compete, in order that the strongest of them may be entered to represent the company in the competition open to railway companies of the kingdom for the association's challenge shield. Upwards of 5,500 members of the Great Western staff have gained the certificate of the association, and during the past twelve months "first aid" has been rendered in upward of 1,000 cases. Sixty-two members of the company's staff were accepted by the War Office for volunteer ambulance service in South Africa.

London and Southwestern Ambulance Class

Railway Herald (London), March, 30, 1901, p. 16.

The Waterloo station, London and Southwestern Railway ambulance class, twenty in number, which has been under the able tuition of Dr. Oswald, of Kennington Road, met at Brunswick House, Vauxhall, on Thursday evening, March 21, at 8 p. m., for examination. There was also present a class from Nine Elms, numbering about nineteen in all, of which ten were to be examined for their second and third certificates, the remainder, with the whole of the Waterloo men, except one, being up for the first time. Dr. Forbes Winslow was the examiner, and the second and third course men were able to come out of their ordeal at his hands very creditably; the candidate from Waterloo in this section, who passed his first two courses as far back as 1887-9, coming through the third course, after an interval of some twelve years, with flying colors. Dr. Winslow then subjected the Nine Elms' first-course contingent to a viva voce examination, while the section from Waterloo were set to the practical work of bandaging, etc. The positions were then reversed, and at the conclusion the examiner expressed himself as being well pleased with the work done by all. He reminded them, however, that what they had to especially guard against was over-confidence, and although they might be fairly well versed in "first-aid," they were never to forget that they were not doctors.

Hospital Cars for Railway Service

International Journal of Surgery, April, 1901, p. 128.

Dr. W. L. Estes, chief surgeon of the Lehigh Valley Railroad, has written a very interesting article on Hospital Cars. He says the Inter-State Commerce Commission shows in round numbers there were 51,743 railroad casualties to persons in the year just ended. There were 7,123 fatalities and 44,620 injuries. The total casualties to the British Army in the Boer War, amounts to about 48,000. Continuing he says, scarcely any organized efficient system for assisting and caring for injured persons properly exists on many of the railroads in America. Dr. Estes, while believing in the advantage to be derived from the use of hospital cars does not minimize the fact that there would be considerable expense involved in such equipment, and he rightly holds that efficient "First Aid" is the prime consideration. An instructed man without an hospital car is better than an uninstructed man with every appliance for final and permanent treatment at hand. First Aid is not intended to be final treament, but it is most important, because on it depends, in many cases, the nature of the subsequent treatment. Uninstructed treatment may make an injury more serious. "First Aid" may alleviate suffering and never makes matters worse.

The Hospital Car would be useful on a railroad which is composed of short lines radiating from a common centre on suburban short lines, or on railways which have a system of small emergency hospitals along the lines and one or two "base hospitals" at the termini.

Dr. Estes outlines the circumstances under which Hospital Cars perhaps attain their greatest usefulness. They might be used for the transportation of sick and injured passengers. He says it is a matter of the commonest experience for persons suffering from pulmonary tuberculosis to travel long distances in railway coaches. Sleeping cars are especially apt to be selected for these ailing persons. Efficient disinfection of railway coaches, especially sleeping coaches, is usually neglected. It is astonishing when one reflects upon the subject, that sanitarians have been so dilatory and slow to appreciate the great danger to the traveling public from the contamination and infections of railway cars, and that no laws or rules have been passed to meet this crying need of modern times.

Miscellaneous

Cheap Steel

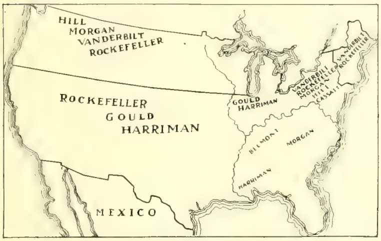
Iron and Steel, March 23, 1901, p. 7.

The manager of the company asserts under his own signature that pig-iron can be produced at Sydney, C. B., for $5.50 per ton. The Belle Isle ore bed of Newfoundland, which the company controls, is rich and easily worked; coal and limestone are convenient, so here at once are vast advantages. The confident hope with which people in the Far East of Canada regard the future of these extensive works is shown in the steps already being taken in New Brunswick as well as Nova Scotia towards the founding of steel shipyards to take advantage of cheap steel.

Community of Ownership

Common Carrier, April, 1901, p. 69.

Community of interest or ownership is thus explained: It is an understanding or agreement, verbal or written, probably the latter, between half a dozen financial leaders to control two-thirds of the railway mileage of the United States and to maintain rates. The Common Carrier gives the names of seven or eight men who thus control 108,404 miles of road, the table of roads, grouped as controlled, is given below. The writer further remarks that community of ownership will not mean low wages or high rates. Under private ownership men of ability will be well paid. It is the government that pays modest salaries for responsibility. Railway owners believe with Andrew Carnegie, "There is no price too dear to pay for perfection."



A COMMUNITY OF OWNERSHIP MAP OF THE UNITED STATES

I. VANDERBILT GROUP.	
N. Y. C. & H. R.	10,016
D., L. & W.	951
C. & N. W.	8,550
	19,517

III. HARRIMAN GROUP.	
Ill. Cent.	5,000
U. Pac.	3,029
Ore. R. R. & N. Co.	1,137
Oregon Short Line	1,498
Chi. & Alton	918
So. Pac.	7,723
Kan. City So.	833
Chi. Ter. Trans.	107
	20,245

II. MORGAN GROUP.	
Southern Ry.	6,807
M. & Ohio	879
Q. & Crescent	1,115
Cent. of Ga.	1,835
Ga., So. & Fla.	285
Macon & B'ngham	97
P. & R.	1,891
Lehigh Valley	1,404
Erie	2,271
Cent. of N J.	677
A. C. Line	1,812
	19,073

IV. P'NNSYLV'NIA GROUP.	
Penn. System	10,031
B., R. & P.	650
West N. Y. & Penn.	633
Ches. & Ohio	1,476
Nor. & West.	1,671
B. & O. System	3,156
Long Island	603
	18,220

V. GOULD GROUP.	
Missouri Pac.	5,326
Texas & Pac.	1,599
S. Z. S W.	1,265
Int. & Gt. Nor.	825
Denver & Rio G.	1,675
Mo., Kan. & Texas	2,423
Rio G. West.	603
Wabash	2,358
	16,074

IX. IND'P'ND'NT SYST'MS.	
Seaboard Air Line	2,591
Plant System	2,170
C. M. & S. P.	6,592
Rock Island	3,819
C. B. & Q.	8,070
A. T. & S. F.	7,808
S L & S F (K C M & B.)	3,000
Chi. Gt. West.	1,023
Col. & So.	1,142
Perre Marquette	1,762
	37,977

VI. HILL GROUP.	
Gt. Northern	5,185
Nor. Pac.	5,188

VII. BELMONT GROUP.	
Louis. & Nash.	3,235
Nash., Chatta. & S. L.	1,195
	4,430

VIII. BELMONT-MORGAN.	
Georgia R. R.	307
West & Alabama	128
Atlanta & West Pt.	87
	522

SUMMARY.	
Vanderbilt	19,517
Harriman	20,245
Morgan	19,073
Pennsylvania	18,220
Gould	16,074
Hill	10,373
Belmont	4,430
Belmont-Morgan	522
	108,454

New Fast Train on the Erie

Leonard's Railway News, April 20, 1901, p. 2.

Beginning June 1, the Erie will put on a new passenger train, to leave Chicago at 10.30 a. m. and reach New York at 4.30 the next afternoon, making the time for the trip 29 hours. It will run via Jamestown to Buffalo and thence via Hornellsville to destination. This puts the Erie on a par with all the other eastbound roads out of Chicago in the matter of a morning train, and one object in putting it on is to provide for Pan-American Exposition traffic. After the exposition it may be made a 26-hour train, and run over the shortest route that can be devised without including Buffalo.

Novel Air Compressor Plant

Locomotive Magazine (London), April, 1901, p. 73.

Instead of running new and repaired locomotives for trial trips, it is proposed to place them on a series of friction wheels, or rollers, which, when put in motion, will operate an air compressing plant destined to provide power for the shop tools driven by this medium. In large works, where a new or repaired engine is being turned out daily, such procedure should be econmical. A novel compressor for the same purpose has been made out of an old locomotive at a shed repairing shop. One cylinder, 17-in. by 24-in. drives the main axle and through it the shop shafting, whilst the other has been fitted with a liner 9-in. diameter to do duty as an air pump. Through the space between the liner and the cylinder bore, cold water circulates for cooling.

Baggage Checking in England

Railway Herald (London), March 30, 1901, p. 17.

The Great Eastern is going to try the much-vaunted American system of baggage checking. But passengers wishing to avail themselves of it must be at the station ten minutes, at least, before the booked time of departure of the train they wish to travel by. This is fatal. Ten whole minutes! Monstrous! What the great British traveling public want is some system which will permit them, and their luggage, to catch a train ten minutes after it has started!

Coal Production

Literary Digest, April 20, 1901, p. 479.

The world's output of coal for 1899, as compared with that for 1845, is given in the annual report of the Miners' Federation of Great Britain as follows:

	1845. Tons.	1899. Tons.
Belgium	4,960,000	21,000,000
France	4,141,167	32,000,000
Germany	3,500,000	101,000,000
United States	4,400,000	226,000,000
Great Britain	31,500,000	220,000,000
Rest of the World	1,700,000	50,000,000

Commenting on this report, the St. James Gazette (London) declares: "Despite these large figures England positively must economize her coal supply."

"The best steam engines are utilizing only one-twelfth of the energy available by the combustion of fuel, while the ordinary steam engines utilize a far less proportion. Whether our coal supply is sufficient to last for some centuries, or, whether, as is the opinion of many competent authorities, a serious coal famine will begin to be felt within the lives of the present generation, economy in the use of coal is unquestionably of the utmost importance, and the investigation of the best means of effecting such economy would repay even a large expediture. If the result of such inquiry were merely to effect an economy of one per cent. in the consumption of coal, this would mean an annual saving to the coal consumers of this country of nearly one and two-thirds million tons, worth at last year's prices about £625,000 ($3,125,000)."

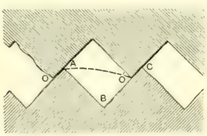
[At the meeting of the British Association for the Advancement of Science, held in Toronto, Canada, in 1897, Lord

Kelvin (formerly Sir William Thompson), showed that the atmosphere of the British Isles did not contain enough oxygen to burn all the British coal. He said: "All known fuel on the earth is of ancient vegetation. One ton of fuel takes three tons of oxygen to burn it, and, therefore, its vegetable origin, decomposing carbonic acid and water by power of sunlight gave three tons of oxygen to our atmosphere. Every square metre of the earth's surface, bears ten tons of air, of which two are oxygen. The whole surface is one hundred and twenty-six thousand millions of acres, or five hundred and ten million millions of square metres. Therefore there is not more than three hundred and forty million million tons of fuel on earth, because, probably, all oxygen in the atmosphere came from primeval vegetation. The surely available coal supply of England and Scotland, estimated by the Coal Supply Commission of 1871, is one hundred and forty-six thousand million tons. This is approximately six-tenths of a ton per square metre of Great Britain. The commission estimated fifty-six thousand million tons more of coal as probably existing in less accessible strata. Therefore it is quite certain that Great Britain could not burn all its own coal with its own air, and that the coal of Britain is considerably in excess of the fuel supply of the rest of the world per equal areas, whether of land or sea."—Eds. Railroad Digest.]

Brake Shoe Friction

Railway and Locomotive Engineering, April, 1901, p. 172.

In a communication to Railway and Locomotive Engineering, Mr. E. H. Bendel claims that the reason why the retarding force of a brake is less at high speed than at low, is not on account of the lessening of friction, but because the brake shoe tends to fly off at high speed. Locomotive Engineering commenting on the letter, says "perhaps the clearest explanation of the difference in brake-shoe friction at high and low speeds is given in the following description and illustration, taken from the Galton-Westinghouse brake trials in England in 1879. Referring to the accompanying sketch, Captain Galton said as follows: "It should be borne in mind that any two surfaces which are placed in contact are not perfectly smooth surfaces, but have small inequalities or roughness upon them. The figure



shows in a very exaggerated form what two surfaces in contact may be supposed to be like. When the surfaces are at rest relatively to each other, the hills of the upper surface will fit closely into the hollows of the lower one. But if the surfaces are in rapid motion past each other, the upper surface will not have time to fit itself into the lower, but would take a position like that shown in the figure. Then any point at O of the upper surface would first be dragged up to the vertex A, and would then fly across the space A C, till it struck some point O on B C. As the speed was greater, the distance through which O wonld fall in the passage would be less; consequently the distance O C would be less, and the work of dragging O up to the vertex C would be less also. Hence it might be seen how the actual work done per foot run of service, or in other words, the apparent coefficient would be less as the speed was greater."

The Pressed Steel Car Company's bolster has been specified on the 250 coal cars recently ordered by the Indiana, Illinois & Iowa from the American Car & Foundry Company.

The Railways of Canada

Consular Reports, April 3, 1901, p. 1.

On June 30, 1900, there were in Canada 17,824 miles of railway, of which 466 miles had been built in the twelve months covered by the report of the minister lately presented to Parliament. There were also 2,558 miles of sidings. Of the total, 17,694 miles were laid with steel rails and 591 miles were double tracked. The system was owned originally by 154 companies, but by amalgamations and leases the controlling influence is now in the hands of 86 companies and of the Government of Canada, which operates two roads —the Intercolonial and the Prince Edward Island lines. There is nothing, perhaps, which better shows the development of the country since confederation than the statistics of the railways. Construction began in 1836, when there were 16 miles of road in operation; and there was no increase till 1847, when 38 miles were added. In 1850, the record stood at 66 miles. In the following decade the Grand Trunk was conceived and built, and in 1860, 2,065 miles of road were in operation. In the next five years 175 miles were added. In 1866 the total was 2,278 miles, and at this figure the system remained for three years. Between 1890 and 1900, 4,506 miles more were built and the total of 17,657 miles reached. In the operation of the systems there are employed 2,282 locomotives, 2,166 passenger and 662 baggage cars, 64,979 freight cars 1,928 cars for conductors and railway service, and 611 snow-plows and flangers. The traffic carried during the year ending June 30, 1900, comprised 21,500,175 passengers (only 7 of whom were killed) and 35,946,183 tons of freight. Passenger trains travelled 20,922,098 miles; freight trains, 24,662,906 miles; and mixed trains, 9,592,867 miles. The earnings of the roads during the year were $70,740,270, an increase over the year 1899 of $8,496,481. The working expenses amounted to $7,699,798, an increase of $6,993,581, leaving net earnings of $23,040,472, or $1,502,804 more than in the year ending June 30, 1899.

Fewer Sections in Steel Shapes

Iron Trade Review, April 11, 1901, p. 25.

As soon as the question of economical methods of operating is disposed of, the United States Steel Corporation will probably turn its attention to the further standardization of structural steel sections. The numbers of sections rolled in this country is even now less than in England or Germany, but it is thought probable that a still further reduction in the number of standard shapes will be made. It is estimated that a saving of $1 per ton can be thus effected by reducing the number of rolls now required to produce sizes which will eventually become obsolete. There is likely to be some objection at first when architects and bridge builders are informed that certain sections are no longer being rolled. This is not, however, expected to be long-lived. Great Britain rolls 63 different sections of steel channels. Germany rolls 20. The mills of this country took this matter up through the American Steel Manufacturers' Association a few years ago, and reduced the number of sections to 14. Great Britain leads in angles of unequal sides, rolling 59, as compared with 18 in the United States, and 14 in Germany. In beam sections Great Britain leads with 49. Germany follows with 33, while the United States rolls 17. The sum total gives Great Britain 171 sections, Germany 67, and this country 49. In Great Britain a movement has been started to cut down the number of sections rolled, and there is little doubt that as soon as British iron masters realize the economies involved they will follow Germany and the United States in this matter.

Heavy Locomotives in the "Two-Penny Tube"

Acting upon the invitation of the Central London Railway the Board of Trade has appointed a committee to consider the question of vibration caused by the working of the line, regarding which many householders along the route have made complaint. The committee will ascertain what alteration can be made to remedy the trouble. American engineers say that the company is using electric engines that are three times heavier than necessary to perform the work they are called upon to do.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.
Official Organ of the Master Car and Locomotive Painters' Association

M. C. & L. P. A. Portrait Gallery

ALFRED L. PAYNE.

As "the course of empire" of our Association eastward "takes its way," now and then, (the recent action of our Advisory Committee to wit) so we turn to New York this month for a subject for our portrait and sketch column; and give herewith that of Mr. A. L. Payne, Foreman Painter, Metropolitan Street R. R. We have the promise of another from the same locality for our next issue. Mr. Payne tells the story of his painting life as follows:

"Like many of our fellow-craftsmen, my first experience in painting was in a carriage shop. After leaving school, I served my time as a coach painter, turning out only heavy work, such as "broughams," etc. After six years of close confinement in a crowded shop I obtained a position in the Erie R. R. shops, at Jersey City, under Mr. Bradt, in 1872. About a year later I was sent to the Elmira shops by the company to work on the sleeping cars, made by the "New York Sleeping Car Co.," which was soon after absorbed by the Pullman Palace Car Co. In 1874 and 1875 I was with the D., L. & W. R. R. at its Scranton shops with Mr. J. Runyan, afterward with the Pullman Company, at the Elmira shops, until they moved the works to Wilmington, Del., in 1884. Returning to my old home, Jersey City, I then obtained a position in the Meadows shops, of the P. R.R ., under Mr. J. Hoseley as letterer and striper. In 1892 I accepted a position as foreman painter in a Horse R. R. shop, in New York City, now a part of the Metropolitan Street R. R. system. In 1894 this system began to absorb nearly all the lines of street railways, resulting in the closing of about eight shops and opening of four new, large, paint shops, one having a capacity of 125 electric cars on one floor, thus bringing all divisions under my supervision; also the painting of engines in power houses, together with electrical machinery in sub-stations, depots and offices.

It may be interesting to my steam railroad friends to know that as far as my experience with street railroad systems and street railroad people goes I have found it anything but a "Field of Cloth of Gold." For methods and economy in repair shops I find steam railroads twenty years in advance."

Mr. Payne joined the association in recent years and was present at the last two conventions, in Philadeiphia and Detroit.

A. L. PAYNE

Next Place of Meeting

Official notice to Members of the Masters of the Master Car and Locomotive Painters' Association.

The letter ballot submitted to members asking for a vote on next place of meeting has resulted in the choice of Buffalo. Therefore the next convention will be held in that city, September 10, 1901.

ROBERT M'KEON, Secretary.

The Flatting of Varnish and the Painting of Galvanized Iron

Editor Railroad Paint Shop.

I read the points, made in our friend, Mr. Brazier's article about varnish flatting and paint peeling from galvanized iron, etc. Our friend, Mr. Hubbs, goes into detail about varnish flatting; and as he admits, the remedy is not practicable in most shops, especially where a large output is expected; and where the plant must be maintained so as to get all of the equipment through the shop at least once a year. The proper treatment, in my judgment, to prevent varnish from flatting is, first of all, to locate the cause before the car is varnished. If the terminal cleaning of these cars has been done with an alkali, or caustic even in a supposed mild form; the cars will flat down when they are shopped even after cutting in, all over, with body color. Again, if a soap is used for shop washing that has not all of the fat chemically dissolved it will leave a thin film of fat or soap-oil on the surface of the car, that will readily dissolve as soon as the body color is applied, and is actually incorporated into the body color. This chemical change takes place as soon as the first coat of varnish is applied, and the body color not having much oil, and in some cases not a drop of oil, this chemical at once attacks the oil-life of the varnish, and feeds on the oil according to its strength, and causes the flatting down. Another cause of varnish flatting during the hot summer is caused by washing a car, and following up inside of a few hours by cutting in with body color, and hermetically sealing up dampness, and, next day, varnishing instead of first letting the car dry out thoroughly. If a car, under such treatment, is run out of the shop during the hot sun of June, July or August it will flat down, and no treatment of sun bath or any other local treatment will ever restore it until, after a few months of service, it is reshopped and revarnished.

Mr. Brazier also asks the question: "What is the best method of painting galvanized iron?" I cannot offer the best method, for that would be presumption on my part, but I will endeavor to describe some of my personal experiments and the results obtained. First—It is my opinion that, whenever practicable, galvanized iron should not be painted (it was never manufactured for painting), except in round-house buildings, where the sulphuric acid fumes of coal gas would readily destroy the galvanizing as well as the iron. On depot buildings, down-spouting and valleys it is my opinion it would wear as well unpainted. I have found the following treatment for car shops practically gives good results: Give the galvanized iron a dose of the strongest potash, newly made, and apply hot. You will note a chemical change on the face of the galvanizing; it turns black. Wash off thoroughly all potash, then apply a coat of mineral oxide.

Mix two parts of mineral oxide and one part of red lead in raw oil. This process is not practical for a coach roof unless sheets are treated before etc., being applied to car, but step-sides, Baker, heater covers, water coolers, etc., can be treated in this way.

Proof of merit in the potash treatment of galvanized iron is this: It neutralizes the oxide of zinc left on the surface of the iron in its manufacture. The merit in one part of red lead is that it acts as a drier, and gives the

paint the elastic qualities necessary for perfect adhesiveness and durability. (Japans and liquid driers do not expand and contract with the iron and are the first causes of scaling.) I have followed the treatment just described, the past fifteen years, and have noted that on trains composed of sleeping cars, their canopies, Baker heater covers and bull nose of cars, would peel, while my cars averaged 90 per cent. better results.

A coach roof ought never to be made of galvanized iron; there is no economy in it; and, in my judgment, it is not up-to-date car building. The cause of tin roofs scaling is more the change of tin from small sheets made by the charcoal process, to tern plates, which are made by a new process, and are dipped in tallow. If the painter does not remove this tallow with benzine, gasoline, or turpentine, he will have scaling in frosty weather. Again, these plates vibrate more than when applied in smaller sheets causing the paint to crack from continual vibration; the water gets under them, and freezes. Then, daily, during cold weather, the process of tearing up the paint goes on. A canvass roof kept well painted is far in advance of tin or galvanized iron.

Yearly care of a tin roof is about $5.00
Yearly care of a galv. roof, about $4.00.
Yearly care of canvass roof, about $1.50.

If any foreman differs from me I want him to put the hooks into my article and tear it to pieces, for I have written it for the purpose of getting some new ideas or practices better than my own, or satisfy myself that now I am possessed of the best.

The painters ought to practice doing things left handed, or pay the penalty of 11c. or more when they come to Buffalo.

J. G. KEIL, F. P., L. S. & M. Ry., Buffalo, N. Y.

A Veteran Fallen

Our old esteemed friend and associate, Jacob Weymer, has gone to join the silent majority. Mr. Weymer has been a well-known figure at not only our own conventions for a quarter of a century or more, but at those of the Master Car Builders' and Master Mechanics' also. Formerly he was Master Painter of the Erie Railroad and a workman of the old school. He became connected with the varnish house of Clarence Brooks & Co., (then Brooks & Fitzgerald), some thirty years ago and was a very successful salesman, during all of which time he has been personally known to the writer and to the railroad trade and fraternity in general. Kind and generous to a fault, he won a host of friends, and no convention was considered a success without "Jake" Weymer in attendance, where, in former years especially, he always took an active and prominent part. Personally known to the writer for so many years, he never had an unkind word to say of any one, not even of competitors in business or the goods they represented, preferring only to praise up his own. Once a man's friend he was never his enemy; no man ever wore better or more evenly as a friend than did he. His death comes as a shock and a bereavement.

The death of Mr. Jacob Weymer removes one of the oldest representatives in the railway varnish trade. He entered it opportunely near the close of the Civil war on a commission basis and, realizing good profits before sharp competition and a general breaking up reduced the prices, he amassed a comfortable fortune for advancing years and had not recently devoted himself as assiduously as formerly to canvassing the trade. He was never married, but lived with a sister in Brooklyn, N. Y.

Following is a letter of Mr. Harry W. Forbes, who is a successor of Mr. Weymer at the Erie shops.

Editor Railroad Paint Shop:

Jacob Weymer died at his home, Brooklyn, N. Y., on Thursday, April 25th, 1901, after an illness extending over a period of four months. His sterling qualities you well know. He learned the carriage and ornamental painting trade in Newark, N, J., and left there to accept the foremanship of the "New York & Erie" paint shops at Piermont, N. Y. The shops were moved to Jersey City, N. Y., when the road changed hands; and, after remaining in charge of the Jersey City shops eight years, he left to accept a position as salesman for Clarence Brooks & Co., varnish manufacturers, and remained with that firm until he died. He was a 32d degree Mason, and a member of several prominent clubs, among which were the "Montauk" of Brooklyn and "Palma" of Jersey City.

H. W. FORBES.

The Care of Window Seats

Not a bad way to restore badly-stained window seats on car interiors, especially in smokers, where cigars scorch them, is to paint and grain them by the transfer graining process, using a rocker instead of a roller. Make your rocker of the requisite width to cover the window seat and just long enough so that, with one rocking, it covers the entire length. Of course you will not get clear into the corner by this process, but the sash stop will cover what is left. Cover the rocker with gelatine about one-half inch thick that has previously been moulded in a flat mould of the same nature that is used on the well-known roller transfer graining process. It will be found that varnish will mar just as much better here over a painted and grained ground, in comparison to the natural wood, as it does on the outside of sashes where its superiority has long ago established. As a matter of fact the car windows are open in warm and pleasant weather when cinders and dust are ground into the varnish under the arms of passengers until it is speedily worn off, to say nothing o the burnishing effect of the sun through plate glass, burning its life out. This operation will save that endless scraping and digging into the wood to get the stains out, annually, leaving them not only rough, but fast using up the thickness of the wood. A little ingenuity and practice will teach one that this is not so difficult and impracticable a thing to do as appears on the face of it.

Every Foreman Painter knows what a vexatious thing it is to keep window seats in a presentable condition; and as they are always right under the nose and eyes of the passenger, they must be kept looking well; there is no dodging it. But in a mahogany-finished car with a suitable foundation painted on and the actual grain from a mahogany board transferred to other sills, no one will ever know whether they are grained or not, unless he sees it done. Ditto the sash exteriors. And the result in durability of varnish will be much better. Try it and be convinced.

Card tables in smoking cars can be served in the same way to good advantage.

The Maintenance of Wooden Ceilings

Those who have been accustomed to take care of passenger car interiors with permanently closed deck sashes will find a difference with the open, tilting variety, especially in the maintenance of the varnished surfaces of deck head linings, and particularly those of wood. They get the effect of the weather elements to some extent sweeping across them, not to mention gases from the engine, and the strong currents of air also cause the lamps to smoke badly, as the brakemen ever and anon get the wicks too high, with the inevitable result that the ceilings get smoked up as black as the ceiling of a lampblack factory; and when heroic means have been taken to clean them the varnished surface underneath has felt the effect of the operation, and will the sooner need revarnishing overhead than cars used to do that were tightly closed. Those foremen painters who have been on duty during the transition from one kind of ventilated car to the other, and have not noticed the difference upon their work, may have been caught napping until it is too late. Better keep an eye aloft to the wood deck-linings, especially of quartered oak or other light wood, lest they get into a perished condition and the smoke and grime enter the pores of the wood; for then it is too late to remedy them, except to paint them over. Then, again, four duplex round-wick oil lamps will create a lot of heat in a car deck, and this has a tendency to dry up the life of the varnish in winter, apart from the blistering hot sun beating down

upon the roof in summer. In short, a wood head lining, especially in the deck with tip sashes, has got to be looked after to keep it in good condition. Do not be content with a superficial look at it; get up and feel the surface with the palm of the hand, to be sure it is not perishing, or the grain of the wood raising by the protrusion of the glue from the veneers caused by the action of intense heat and moisture.

The care of wood linings is a great and troublesome problem. They may be over-varnished and they may be not varnished enough. Much discretion must be exercised in this regard, for no inflexible rule can be formulated by anybody, on account of their varying conditions.

Whenever they have got beyond the point of maintenance in the natural wood, the varnish can easily be removed with a varnish remover, and then they can be painted a nice, light, cheerful tint and stenciled in some tasteful way and revarnished, and then they will look as good as new. But doubtless some will be found good enough to further finish in the natural wood when the old grime and varnish has been removed with the varnish remover. Of course, it would expedite matters very much on the painter's part if wood linings could be taken down by the carpenters for this kind of a renovation, but that often entails the splitting and spoiling of valuable moldings that have been securely nailed, to say nothing of probable injury to the lining itself. With a little practice with a suitable paste, varnish remover and proper tools, this will be found quite unnecessary.

Nothing enhances the value of the appearance of a coach interior more than a clean, tasty ceiling, and, on the contrary, nothing adds more to its general shabbiness than one gone to ruin, dirt and grime which cannot be remedied by any other means than a general renovation or renewal. When not needing revarnishing, these wooden linings could be occasionally cleaned with a suitable oil cleaner, instead of soap or alkali; this would tend to their greater longevity in a presentable condition.

Matching New Colors

Matching Pullman body colors, so that they will stay matched, is "no joke," to use a street phrase. It is open to doubt if the fellow who first designed the Pullman color even thought it would ever have to be matched. If he did he was a matchless taskmaster on a coming posterity, especially when it is considered that this has to be done in the old ramshackle shops, dimly lighted at best, and often darkened at their worst by day after day of cloudy, rainy weather. A streak of sunshine through a window on a varnished panel is the only proof that the matching and touching up thereon will stand the revelations of broad daylight when the car comes to go out "into the open." How important then is a flood of light in our paint shops! How little they get! Don't swear there, Mr. Superior-officer, at that matching on that car that was shoved out in front of your office yesterday. Stop and soliloquise. Think to yourself, What facilities has John for doing his work? You will say, "I believe instead of swearing I'll give him another pane of glass instead of another pain that the swearword would give him. Then I can write on his tombstone, or to the boss of the asylum for the insane, that I am not responsible for it."

Matching the Pullman shades so that they will tone down to the right notch to-morrow when the varnish goes on is about as skilful business as that of an artillery man who elevates his piece with that fine calculation that a shell is dropped into an enemy's camp or fort and knocks everything to smithereens, only it is a different kind of skill. He must get his color of the right tone—not too red, or too green or too black, but just right—and then it must be much too light in shade to-day to allow for its toning down to the right tone to-morrow.

A good way to run a shop is to have one bright young man with a keen eye for colors and shades do all the matching in advance, taking the best and sunniest days for it and doing something else on dark days. These colors, all numbered in pots the number of the car to go on, can be set away in the stock room for the touchers-up, who have less matching skill, to use when the car is ready. Your matcher will wrestle with that color, putting in now a little red, then a little yellow, next some black, and so on, till he thinks it's right, then he puts it on the car and fans it with his hat a minute until it dries out and then, with a little vial of varnish, he puts the unstoppered end of it against the car panel just above the spot and allows the varnish to run down over it to bring out the color. And so he works until he gets it—or thinks he gets it! Why proceed this way, do you ask? Well, it is a good way. It quickens the operation. A little varnish will run down over a spot of color without starting it sooner than it can be varnished otherwise. If the color starts with the varnish your idea of the match is lost.

It seems needless almost to say at this juncture that a bad match is worse than no touching up at all, and yet how improvidently a man with his day's time to get in will needlessly slobber color on a car when it would better be left off! For goodness' sake leave it off or "cut in" the car. A very sparing use—into bruises and no more—of a poor match of color is not so bad as a playful slash here and there with the brush and pink paint on a green body! Some will take a brush and swipe on a streak two inches wide to cover a spite scratch that some fool has made with a knife across a panel when the journey's end is reached because the conductor made him settle his fare in full! Then, again, there is such a thing as skilful manipulation of color in touching up—blending it off like into a dry blend, in a dusting fashion, between the new color and the old, instead of cutting it to a sharp, square edge to look all the more prominent and make it a dead sure giveaway of bad matching.

Of course, with our dark body colors, that can be "cut in" between the plain stripes with one coat of color, we do not now make so much nor hear so much of matching body colors as heretofore, when our car bodies were works of art to be preserved almost indefinitely, instead of "cut in." But the "cutting-in" business can be overdone. For three or four years, with good management, cars ought to be successively touched up when stopped for their annual washing and varnishing. Then they can be "cut in" once. Next touched up until burning off and repainting time comes around.

Another important thing: have your body color come from one good concern that you can depend on. Do not skip around with your orders to all the good fellows with body color to sell a cent or two less than the firm you know and can depend on.

Interior Finishing of New Cars

The writer has lately been breaking away from some of his old practices and exploiting new ones, among them being the finishing of new mahogany passenger car interiors. Formerly he has been in the habit of filling, sometimes doubly filling, and giving three thin coats of shellac, sandpapering each coat carefully, and then following with two coats of varnish, leaving the latter in the full gloss. Lately he has come to the conclusion that, with a better filler obtained, he can get along with one coat paste filler, well worked into the wood and rubbed off with excelsior, and one coat of shellac, rubbed lightly with sandpaper when dry, followed with two coats of rubbing varnish, the last coat being rubbed to a dead finish with pumice stone and oil and plush or felt rubber. A car has just been finished in that way, which seems to be satisfactory at less cost and trouble than formerly. On another job he thinks of using two coats of filler and omitting the shellac altogether; not that it will be done any cheaper than the work just mentioned, but the shellac under the varnish will be avoided altogether, which we believe is detrimental to the durability of the job. The cost of thoroughly cutting down a coat of shellac with sandpaper is equal to the cost of rubbing an interior to a dead finish with pumice stone. So that a dead-finished car in this instance is no more expensive than one left in the full gloss; and probably not so much so, for great care must be taken to make a plate glass-like surface to a job to be left in the full gloss, whereas rubbing it down hides many defects and renders it rather more durable.

There is more than one way to kill two cats.

NOTES AND COMMENTS

Mr. Edward Webb, one of our members, who severed his connection as Foreman Painter, with the Laconia Car Co., recently, is working for the Metropolitan Street R. R. in New York under Mr. A. L. Payne, whose portrait and sketch appear in another column.

Some cars newly varnished having turned white in recent heavy rains, the chemist of a varnish concern gave me a pointer in tests for acids and alkalies. The latter was suspected in the cleaning compound as the cause of the trouble, but this test proved it was not. A white batten or moulding was taken from the car and laid in a horizontal position and wet with pure water and strips of blue and pink litmus paper were laid on it; the blue paper turned pink, proving that it was acid on the varnished surface that caused the trouble. If the pink paper had turned blue it would have shown that alkali was chargeable with the trouble. It was thought that acid from the roofs was the cause. This may have been the case; still, as the cars had been for a long time near the main track where the sulphurous smoke of passing trains had constantly enveloped them, this may have been the cause of the trace of acid that turned the blue paper a pink hue. A peeling roof, exposing the tin, with possible traces of the tinsmith's muriatic acid, was thought to be the cause. Yet cars turned white with the paint on the roofs intact, which seemed to disprove this claim.

With thirty years' experience I never saw a case just like this before. That the trouble is attributable to local causes is evident. I mention this incident and this test for the information of the paint-shop fraternity in general. They may wish to try it. Litmus paper may be obtained at most any drug store.

The B. & M. paint shop output for the month of March was 206 cars cleaned, painted or varnished. Fifty-eight were painted and 148 touched up, or "cut in"; and varnished, or a total of 1,106 for nine months ending March 31. Sixty-two were varnished inside in March; 317 freight cars were painted for the month, or a total of 2,898 for the nine months ending March 31. Ten-hour time was resumed April 1. Nine hours per day having been the working time since October 15, excepting at two or three shops where engine work is done. Monday, April 15, the shop output and working force were reduced, in accordance with a general curtailment of expenses for the current fiscal year ending June 30, at which time it is expected, notwithstanding this reduction, the annual shopping and varnishing of the equipment will be completed, and the renumbering also, save 90 cars that went out of shops from July 1 to about October 15, 1900, when renumbering began.

A Correction. The last paragraph of the second note (under "Notes and Comments," page 160, April issue), should read Boston AND Maine, instead of "Boston AND Albany" that has gone through this struggle of parting with the word ("and") and substituting the character "&."

Transfers or, in other words, decalcomania designs, furnish a cheap and ready means of putting on and maintaining in a uniform way the small lettering on the interiors of passenger equipment, such as the name plates on the middle rails of end doors and the numbers of the cars, toilet-room doors, ets., made up in large lots, a neater job can be done this way for a tithe of hand and brush lettering. Another good use to which they can be put is for the platform warning on the outside of the doors which is usually a bronze casting screwed on, reading "Passengers Not Allowed to Stand on the Platform." The old metal on these things will about pay for the new designs in transfer, which will read a hundred-fold better.

We learn that some recent changes have been made on the staff of our associate, B. E. Miller, Master Painter of the D., L. & W. R. R., at Scranton, Pa. Mr. W. H. Estabrook has been transferred from the locomotive department to the charge of the coach painting.

Mr. C. I. Eagle, heretofore locomotive foreman painter for the L. S. & M. S., at Cleveland, has been appointed to succeed Mr. Estabrook in the same capacity, at Scranton. Mr. Estabrook was formerly with the Illinois Central at Clinton, Ill.

The month of April, 1901, will go into history as the wettest April for thirty years in the vicinity of Boston. Shop yards are full of freight cars that a brush cannot be touched to for fear of the paint will wash off. So far (April 25) there have been but three or four fair days during the month. Appointed by the president of the M. C. & L. P. A. to make terminal cleaning tests for this section, the editor of these columns began on a car in a little dark shop in the Fitchburg Division's Boston yard, April 24, with three kinds of cleaners, "Sam" being a witness of the performance. The weather has handicapped this business so far. If anybody "to whom these presents may come" has a terminal cleaner he wishes tried and will send a working sample, free of costs, to Charles E. Copp, General Foreman Painter, B. & M. R. R., Lawrence, Mass., it will get its just dues in a forthcoming report to be presented at our convention in September.

"Now is the time to subscribe."

I learn that most of the gilding on the Pan-American Exposition buildings at Buffalo is being done with Coe's Gilding Wheels and Riobbn Gold Leaf. The W. H. Coe Manufacturing Co. says that during the past six months, it has been very difficult to fill orders with its usual promptness, owing to the enormous and increasing demand for its goods in all branches of the painting and decorating trades.

Coe's Gilding Wheel is rapidly pushing itself to the front in other lines, as well as our own. It has become indispensable in car shops, and deserves the success it has met with.

"Among all colors," says a scientific writer, "the most poignantly emotional tone undoubtedly belongs to red." If you doubt this try it on a bull!

Naturally all who inspect the great central power station of the Niagara Falls Power Company at Niagara Falls become greatly interested in the wonderful feat of transmitting thousands of horsepower over solid copper and aluminum conductors from the Falls to Buffalo. People wonder what percentage of the power designed to be transmitted reaches Buffalo. In other words, they wonder what the percentage of loss is in the transmission.

For the benefit of those who seek this information, it may be stated that the loss of current in the transmission is less than twenty per cent., which is equivalent to saying that of the Niagara energy started out on the Niagara end of the transmission lines, over 80 per cent. of it reaches Buffalo and is available there for light, heat and power purposes.

For its unexampled electrical display the Pan-American Exposition will receive five thousand horse power electric power from the great plant of the Niagara Falls Power Company, twenty miles distant.

A beautiful folder, containing maps and profusely illustrated, has just been issued by the New York Central, devoting a large amount of space to the Pan-American Exposition. It contains two pages of interesting facts about Buffalo, which now ranks as the fourth shipping city in the world; then it has twenty-one pages in regard to the Pan-American Exposition, with a map containing a 500-mile circle with Buffalo as its center, which shows that within said circle is contained more than one-half of the entire population of the United States, and more than three-fourths of the entire population of Canada.

This folder is No. 15 in the Four-Track Series, and gives information about the splendid Pan-American Express, the next night train between New York, Buffalo, Niagara Falls and Toronto, Canada, etc., etc.

A copy will be sent free, postpaid, to any address on receipt of a postage stamp, by George H. Daniels, G. P. A., Grand Central Station, New York.

By the way, "Put me off at Buffalo"!

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

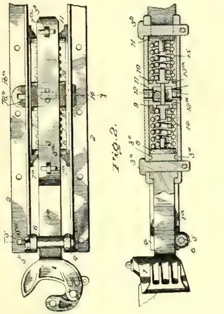
A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

Draft Mechanism

No. 671,368.

PERRY BROWN, of Wilmington, Del.

This invention consists in the combination of a draw-bar; a draft-beam on each side thereof; front and rear followers; means for connecting said followers to said draw-bar; a stop or block projecting from said connecting



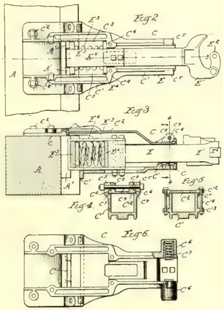
means intermediate of said front and rear followers; a spring between the front follower and said stop or block and the rear follower; stops projecting from said draft-beams and coacting with said followers; and means as the bar 16 between said springs coacting with the latter and with the aforesaid drafting.

Draft-Rigging for Locomotives

No. 670,939.

JOSEPH ELDER, of Peoria, Ill., assignor to Phillip Hein, of Chicago, Ill.

Heretofore it has been customary where the head ends of locomotives are provided with couplers to provide the head-block or pilot thereof with a car-coupler the shank of which was engaged directly to the head-block of the locomotive or in some cases to provide the head-block with a draft-rigging or holder requiring a special form of coupler-shank. In other words, while it has sometimes been customary to attach to the pilot a holder or draft-rigging to which the shank of the coupler is engaged, yet the shank and holder have been so constructed that a special form of coupler-shank had to be used. The difficulty with this has been that if the coupler or its shank became broken a new coupler of that particular form must be provided, often at the expense of much time and trouble.



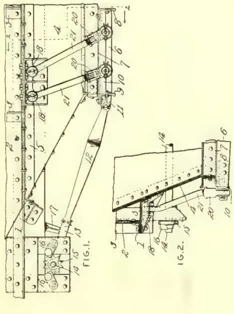
The invention has for its object the provision of a holder or draft-rigging which is engaged to the head-block of the locomotive and is of such construction that it will receive and hold the standard shank and follower-plates of the standard Master Car Builders' coupler, so that if at any time the coupler or its shank becomes broken any standard Master Car-Builders' coupler, no matter of what style, can be substituted.

Door for Hopper-Bottom Cars

No. 671,705.

GEORGE I. KING, Detroit, Mich., assignor to The American Car & Foundry Company.

This invention relates to a new and useful improvement in doors designed especially for use in connection with hopper-bottom cars.



The object of the present invention is to provide adjustable door-hangers in order that doors may be adjusted to different cars, such adjustment taking up inequalities in the manufacture of the car and also taking up the stretching which may be found in the hangers after use.

The invention consists in the combination with a hopper-bottom car, a door for opening and closing the exit for the load, and two hangers for suspending each side of said door, one end of each hanger being pivotally connected to the door, and the other end of each hanger being pivotally connected at different points above said door, said hangers being adjustible longitudinally.

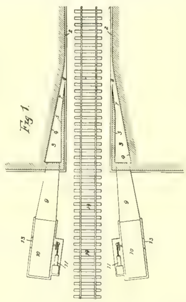
Means for Ventilating Tunnels

No. 671,264.

CHARLES S. CHURCHILL and CHARLES C. WENTWORTH, of Roanoke, Va.

The invention relates to means for ventilating tunnels, and particularly to such means as are applicable to railroad-tunnels which need to be cleared of smoke and gases and supplied with fresh air.

One object of the invention is to provide means for ventilating the tunnel without interfering in the least with



the passage of trains and without decreasing the area of the cross-section of the same, whereby the danger to life and property which exists in the systems of ventilation heretofore proposed and with which we are familiar is prevented.

A further object is to provide means for ventilating tunnels which will be effective in operation and properly and quickly perform the work of ventilation in the most economical and safe manner.

The invention claimed is:

In a ventilating system for tunnels, the combination with the tunnel, of an air-chamber formed in the wall of the tunnel having its inner wall substantially in line with the inner wall of the tunnel and having an opening arranged to discharge air therefrom in

a direction substantially parallel to the axis of the tunnel and adjacent to the wall thereof, and means for blowing a blast of air into said chamber, whereby the blast of air issuing from the chamber into the tunnel will create an induced draft through the tunnel.

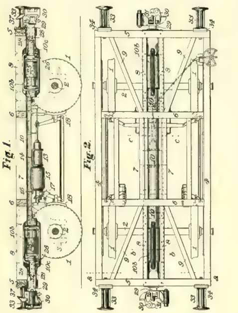
Draft Appliance for Cars

No. 672,112.

GEORGE WESTINGHOUSE, of Pittsburg, Pa.

This invention is more particularly designed for use in connection with railroad-cars having a comparatively short rigid wheel-base, such as are largely employed on the railroads of Great Britain and continental Europe, but is not limited in application to that or any other specific type of railroad-vehicles.

The object of the invention is to provide means readily applicable to existing car-frames and presenting such substantial advantages as will reasonably warrant discarding present con-



structions, whereby the frames may be materially stiffened and strengthened, a simplification of parts and reduction of weight be attained, and a draft appliance be embodied which will oppose a very great resistance to compression without reaction from springs.

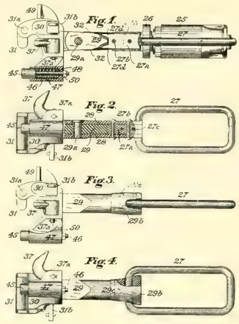
The invention consists in the combination, with a car-frame, of a pressed-metal channel-beam, extending longitudinally below and secured to the central frame members, and having integral casing-sections and abutments for draft and buffing apparatus, and lower casing-sections having corresponding abutments and secured removably to the casing-sections of the channel-beam.

Car-Coupling

No. 672,113.

GEORGE WESTINGHOUSE, of Pittsburg, Pa.

This invention is more particularly designed for use in connection with railroad-cars having a comparatively



rigid wheel-base, such as are largely employed on the railroads of Great Britain and continental Europe, but is not limited in application to that or any other specific type of railroad vehicles.

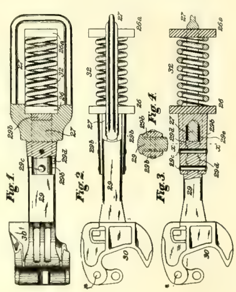
The object of the invention is to provide an automatic car-coupling which will in practice present the advantages of being exempt from liability to uncouple in passing around short curves, of relieving strains on the car-frame in passing curves, and of capability of being coupled with equal facility and security either with another automatic coupling or with a coupling of the link type.

Draft Appliance for Cars

No. 672,114.

GEORGE WESTINGHOUSE, of Pittsburg, Pa.

The invention consists in the combination of a coupler-head, a coupler-shank fixed thereto, a bifurcated pivot-jaw secured to the rear end of the coupler-shank, a draft strap or yoke having segmental bearing faces on the coupler-shank and pivot-jaw, a follower-plate bearing against the rear end of the pivot-jaw, and a spring bearing against the follower-plate.



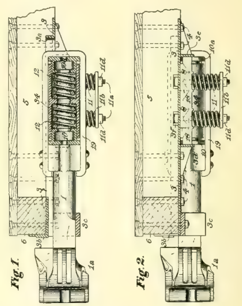
Draw-Gear and Buffer

No.672,116.

GEORGE WESTINGHOUSE, of Pittsburg, Pa.

The present invention relates to and is an improvement in draw-gear and buffing apparatus for raiload-vehicles of the general class or type set forth in Letters Patent of the United States No. 649,187, granted and issued under date of May 8, 1900—that is to say, that in which the draw-bar is combined with a preliminary or initial resistance element having a reactionary capacity, an independent secondary resistence element, the action of which is exerted independently of and supplementally to that of the initial resistance element, and connections through which the movement of the draw-bar in either direction under the application of strain imparts such a strain when sufficiently great, to the secondary resistance element.

The object of the invention is to simplify and economize the construction of draft and buffing appliances of the



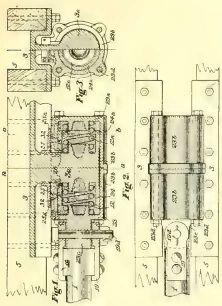
class above specified by the provision of novel and improved means for the attachment and support thereof to and upon a car and the effective exertion of a frictional secondary or final resistance, the detailed members of which and their combined operative relation shall be such as to enable a substantial reduction in the number of parts to be made and the expense and delay of machine-work to be avoided.

Draw-Gear and Buffer

No. 672,117.

GEORGE WESTINGHOUSE, Pittsburg, Pa.

It will be seen that a leading and essential feature of the present invention consists in combining with a draw-bar a piston or abutment and a cylinder, one of which is movable by connection with the draw-bar relatively to the other in order to induce the exertion of resistance by an interposed body of liquid, the movements of the draw-bar



and a liquid reservoir having an opening above the upper level of the cylinder and unsubjected to pressure, whereby traverse of the movable member may be effected without leakage of liquid. In the preferred form of the invention herein set forth a fixed piston or abutment and a relatively movable cylinder are employed; but it will be obvious to those skilled in the art that the relation of the cylinder and piston may, if desired, be reversed—that is to say, the cylinder may be fixed and the piston or abutment be connected to and movable with the draw-bar—without departure from the spirit and operative principle of the invention.

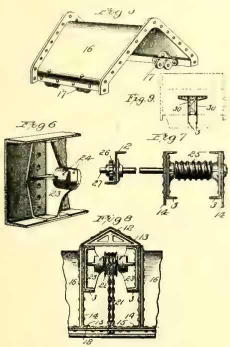
Double-Hopper-Bottom Car

No. 670,960.

GEORGE I. KING, of Detroit, Mich., assignor to the American Car & Foundry Company.

This invention relates to a new and useful improvement in double-hopper-bottom cars of that type wherein the framing and body are composed largely, if not entirely, of metal.

One object of the present invention is to construct a car of the character described with a comparatively favorable ratio of dead weight to revenue-freight and having a large capacity, (say one hundred thousand pounds or more,) the distance from rail to top of sides when the car is empty not exceeding, say, ten feet two inches.



Another object is to arrange the mechanism for operating the doors which control the exit for the load in such position as to be free from and outside of the load contained in the car, so that the operation of said mechanism will not be interfered with and prevent corrosion and freezing of the chain.

Draft Mechanism

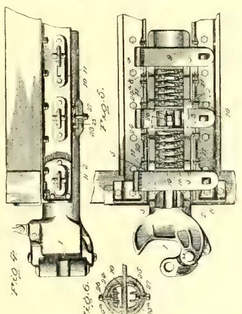
No. 671,370.

PERRY BROWN, of Wilmington, Del.

This invention relates to an improvement in draft-rigging for railroad-cars, and has for one object to provide a simple, durable and easily-attached draft-rigging which will be of the greatest strength in proportion to its weight and size.

Another object is to provide a draft-rigging of practicable form which may be made so as to be housed in the same casting as the draw-bar proper.

It has heretofore been proposed to make a coupler with springs arranged



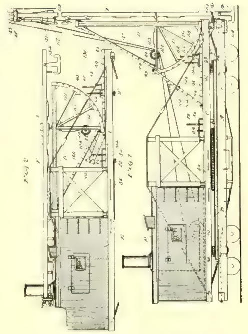
in its shank, as shown in Nash's United States Patent No. 500,074, of June 20, 1893, but the inventor is the first to provide a coupler with its shank adapted to receive draft mechanism in which the same springs are arranged to receive action on both a pull and an impact. Another feature believed to be novel is the arrangement of the supporting-bars, whereby the front bar besides acting to allow the springs to compress against it on a pull also acts to support the weight of the coupler, thereby dispensing with the usual "carrying-iron" or "stirrup."

Pile-Driver

No. 671,242.

WILLIS E. SMITH, of Greenbay, Wis.

This invention relates to a pile-driver use in railway work, the apparatus being mounted on a car to be moved from



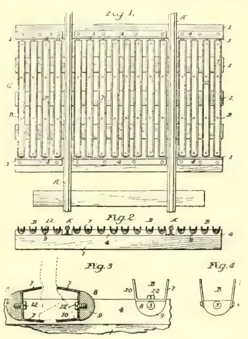
place to place along the railway; and the invention embodies a carriage which is mounted to move longitudinally on the railway-car and on which a deck is mounted to turn, the deck carrying the pile-driver proper, which is of peculiar construction, enabling it to be folded when not in use, and also enabling the leaders to be slued or turned sidewise, adapting the pile-driver to all sorts of work required in railway construction. By providing the longitudinally-adjustable carriage or platform the pile-driver may be adjusted longitudinally with respect to the car on which it is mounted and by providing the deck arranged to turn on the carriage the pile-driver may be adjusted to work at either side of the railway-car.

Cattle-Guard.

No. 672,343.

EDMUND W. WILEY, JR., of Lecompte, Ia.

This invention relates to a new and guard for railway-tracks comprising a series of pivotally-supported guard-rails arranged parallel to each other, said rails being weighted below



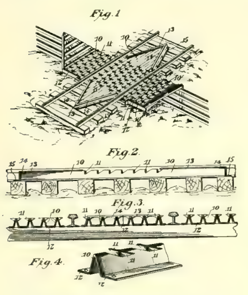
their pivotal points and provided above their pivots with upwardly-diverging side flanges. Should an animal attempt to cross the guard the weight of its foot upon one of the side flanges of a guard-rail will cause the same to swing upon its pivot or trunnions, and by reason of the guard-rails being in such close proximity the leg of the animal will engage with the side flange of the next adjacent rail, causing it to turn likewise. Thus the pressure exerted by the animal upon the two rails will cause its leg to be pinched between the most remote or outside rails causing it to withdraw its leg, which may be easily done without injury thereto.

Cattle-Guard

No. 670,973.

HERMAN W. STEINMANN, of Buckholts, Tex.

The present invention relates to cattle-guards; and the object thereof is to provide an improved surface guard which will effectually prevent the attempted passage of an animal along railway-tracks, but will not interfere with the free passage of trains. This object is accomplished by providing a guard the surface of which has a plurality of spurs and is so constructed that should an animal step thereon its foot will be directed against one or more of these spurs, thus causing the animal to withdraw its foot and not attempt to pass over the same.



In operation the animal upon approaching the guard and attempting to pass will step upon the same, whereupon the spurs will prick its foot and will thus deter the animal from proceeding. As no part of the guard projects above the rails, there will be no interference with the free passage of trains, and the ends of the ribs being carefully protected no trailing or hanging car attachments will catch thereon and the ends will be held from being bent or twisted. It will also be observed that by the above arrangement, the caps or guards 13 not only serve as protectors for the ends of the ribs, but by having the end of the cattle-guard between the rails arranged in the form of a V said caps also act as guard-rails. It will be understood that any desired number of these ribs may be arranged between the rails, and while the spurs have been illustrated as projecting horizontally they may be upwardly inclined at any degree that may be deemed necessary or desirable, and even in certain cases project in a vertical direction. The points of the spurs may also be arranged on a level with the tops of the rails or any distance below the same.

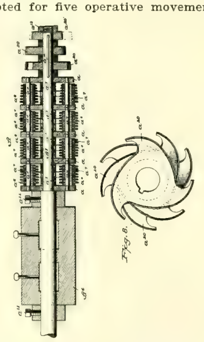
Boiler-Tube Cleaner

No. 672,296.

GAMALIEL C. ST. JOHN, of New York, N. Y.

The object of the invention is in a rapid, economical, thoroughly effective, and non-injurious manner to remove soot, scale, and other accumulations from the interior surfaces of boiler-tubes and at the same operation to polish such surfaces.

The agencies combined to produce the above results are—a two plurality of direct or positive acting entering cutters the axes of which are fixed with relation to the cutter-head-actuating arbor or spindle whereby they have positive action, and a plurality of indirect or resultant acting finishing-cutters the axes of which are shifting with relation to the cutter-head-actuating arbor, whereby these cutters are adapted for five operative movements



—namely, a bodily rotary movement about the axis of the actuating-arbor, a radial movement from the force of centrifugal action, the cutters being projected laterally and contacting with the surfaces of the boiler-tubes, giving impact, a return movement from the impact, a rotary movement about their own axes, and a tangential movement from the loose rolling of the cutters on their axes as they are carried in a circular path about the actuating-arbor, causing a dragging action—the combined movements being like those of a cold or stonecutter's chisel, as usually moved under the impact of a hammer, giving a chipping action, and the force of action of these cutters—that is to say, the degree of their action—being directly proportional to and governed by the speed at which the cutter-head is driven.

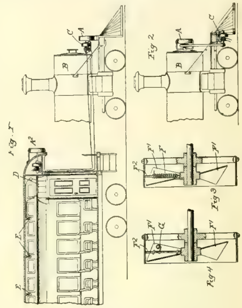
Briefly stated the tube-cleaner characterized by the invention comprises two co-acting mechanisms—namely, the cutter or cleaner-head and the driving mechanism therefor.

Electric-Lighting for Trains

No. 672,877.

JAMES W. GUILLOTT, of Chicago, Ill.

The invention relates to power-developing appliances adapted to be used upon moving bodies—such, for exam-



ple, as railway-trains and the like.

The invention is particularly adapted to be used for lighting the moving body with which it is associated, as in the case of railway-trains. When a railway-train, for example, is moving at a high rate of speed, its motion is greatly retarded by the atmosphere striking against the exposed parts of the train.

The object is to utilize this retarding effect of the atmosphere which necessarily accompanies the operation of railway-trains to generate power to be used in operating lighting devices or other desired devices located upon the train. The inventor says:

In the application of the invention I provide a motor adapted to be operated by the wind, and I locate this motor upon the body or train, so that when said body or train is in motion the relative motion of the motor and the atmosphere will cause said motor to revolve, and thus operate any suitable mechanism which may be connected therewith. I prefer to place the motor in front of an exposed surface against which the wind normally strikes. It is of course evident that this motor may be located in many different positions and that it may be of any construction desired. I therefore do not limit myself to any particular construction of motor or to any particular position of said motor. In the accompanying drawings I have set forth the construction embodying my invention in order that it may be fully understood; but it is of course evident that there are numerous other constructions in which my invention may be embodied.

Personalities

A. J. Ball has resigned as assistant superintendent of motive power of the Cincinnati, Hamilton & Dayton, effective on May 15, to accept the position of superintendent of motive power and equipment of the Toledo, St. Louis & Western, with headquarters at Frankfort, Ind. He will succeed Mr. John S. Turner, resigned.

F. D. Underwood was formally elected president of the Erie R. R. at a meeting of the directors, on April 23, to succeed E. B. Thomas, who was chosen chairman of the board.

T. H. Symington has resigned as superintendent of motive power of the Atlantic Coast Line, and has engaged in the railroad supply business at Baltimore, Md., under the firm name of T. H. Symington & Co. Mr. Symington has been with the Atlantic Coast Line since June 1, 1898, and was formerly assistant superintendent of the Richmond Locomotive Works.

The Canadian Pacific Railway Company announces the following appointments, effective 1st May:

J. W. Leonard, general superintendent of the Western Division, with office at Winnipeg.

C. W. Spencer, general superintendent of the Eastern Division, with office at Montreal.

H. P. Timmerman, general superintendent of the Ontario Division, with office at Toronto.

James Oborne, general superintendent of the Atlantic Division, with office at St. John, N. B.

T. Williams, general superintendent of the Lake Superior Division, with office at North Bay.

John S. Turner has tendered his resignation as superintendent of motive power and equipment of the Toledo, St. Louis & Western, to take effect on May 1, but at the request of the management will retain his position until May 15. Mr. Turner has been with this road since January last. He was formerly at different periods master mechanic Mexican Central, assistant mechanical superintendent Mexican International, superintendent motive power West Virginia Central & Pittsburg, superintendent motive power Colorado & Southern, and superintendent motive power Fitchburg Railroad.

Charles L. Taylor, former assistant to President Charles M. Schwab, of the Carnegie Company and the Carnegie Steel Company, has been elected head of the Carnegie Benefit and Pension System, for which Andrew Carnegie placed in trust $4,000,000 in 5 per cent. bonds.

E. E. Hudson, formerly master mechanic on the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed assistant engineer in the division of smoke abatement of the city of Cleveland, O.

J. B. Braden has resigned as superintendent of motive power and cars of the Wheeling & Lake Erie, and C. S. Morse has been appointed to succeed him, with headquarters at Cleveland, O.

It is stated that J. H. Maddy, formerly press agent of the Baltimore & Ohio, and later chief clerk in the office of Second Vice President and General Manager Underwood, will go with Mr. Underwood to the Erie in a more responsible position.

R. C. Hallett, formerly connected with Julian L. Yale & Co., 1117 The Rookery, Chicago, has severed his connection with that company and will engage in business for himself.

The Simplex Railway Appliance Company have opened an office in the Washington Life Building, in New York City, in charge of W. W. Butler, vice president of the company.

J. F. Enright, general foreman of the Plant system at Waycross, Ga., has been appointed master mechanic of the third division of the same system, with headquarters at Waycross.

T. E. Adams, heretofore master mechanic of the Eastern Railway of Minnesota, at West Superior, Wis., has been appointed general master mechanic of the St. Louis Southwestern, with headquarters at Pine Bluff, Ark., in place of R. H. Johnson, resigned.

F. E. Davison, master mechanic of the Santa Fe, Prescott & Phoenix, has been appointed superintendent of motive power and machinery of the Los Angeles Terminal (San Pedro, Los Angeles & Salt Lake), with headquarters at Los Angeles, Cal., in place of W. N. Best, resigned.

The following appointments on the Chicago, Burlington & Quincy took effect on April 1: J. A. Carney, master mechanic at Beardstown, Ill., appointed master mechanic of the Burlington division, with headquarters at West Burlington, Ia. A. J. Cota, air brake instructor, appointed master mechanic of the St. Louis division, with headquarters at Beardstown, Ill. Jacob Kastlin, heretofore general foreman at the West Burlington shops, appointed assistant master mechanic at Galesburg, Ill., with jurisdiction over the shops and roundhouse.

Sylvester Hogan, widely known in the supply trade, has been appointed railroad representative of the New York Belting and Packing Company, 25 Park Place, New York.

Charles H. Duell, late U. S. Commissioner of Patents, has resumed the practice of law, with office in the St. Paul Building. The firm is Duell, Megrath & Warfield, Mr. Megrath having been law clerk to the commissioner, and Mr. Warfield assistant examiner.

J. Piccioli, heretofore general foreman of the Colorado & Southern, at Denver, Col., has been appointed master mechanic at Trinidad, Col., to succeed I. W. Fowle, resigned.

Sumner B. Ely, recently appointed chief engineer of the American Sheet Steel Company, is a nephew of Theodore N. Ely, chief of motive power of the Pennsylvania Railroad, and a graduate of the Massachusetts Institute of Technology.

J. M. Barr, third vice president of the Atchison, Topeka & Santa Fe, who is to become vice president and general manager of the Seaboard Air Line, began his railroad career as a messenger boy in 1871, on the Pennsylvania. In 1888 he became superintendent of the Wyoming & Nebraska divisions of the Union Pacific, and in 1890 division superintendent of the Chicago, Milwaukee & St. Paul. Five years later he was appointed general superintendent of the Great Northern and resigned this position in 1897 to become vice president of the Norfolk & Western, and in April of the same year assumed the duties of general manager. Mr. Barr became connected with the Atchison, Topeka & Santa Fe as third vice president in 1899.

H. A. Pike, recently with the Standard Railway Equipment Company, of St. Louis, has accepted a position with the Chicago Pneumatic Tool Company, which he will represent in the Philadelphia district. Mr. Pike once before represented the Chicago Company.

J. A. Halladay, now managing the electric headlight department of the Chicago Pneumatic Tool Company, has removed from Chicago to Philadelphia. The headlights are to be manufactured at the pneumatic tool works at Olney, Pa., a suburb of Philadelphia.

Roger Atkinson, formerly superintendent of rolling stock of the Canadian Pacific Railway, has accepted the position of assistant superintendent of the Canadian Locomotive and Engine Company (Ltd.) of Kingston, Ontario.

Thomas Tait, formerly manager of Eastern lines of the Canadian Pacific Railway, has been appointed manager of transportation for all lines, with office at Montreal.

William Whyte, formerly manager of Western lines of the Canadian Pacific, has been appointed assistant to the president, with office at Winnipeg.

R. O. Cumback, formerly general foreman of the Elizabethport, N. J., shops of the Central Railroad of New Jersey, has been appointed to the newly created office of superintendent of car and machine shops, with headquarters at Elizabethport, as heretofore.

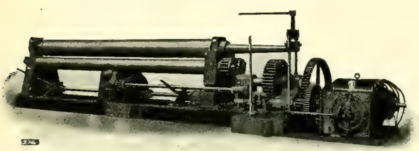
J. McGie has been appointed master mechanic of the New Jersey Central division of the Central Railroad of New Jersey. Mr. McGie was formerly division master mechanic on the Great Northern, and now takes the position at Elizabethport, N. J., lately vacated by Mr. J. S. Chambers.

Electrically Driven Bending Rolls

The accompanying engraving illustrates a novelty in bending rolls made by the Bullock Electric Company, of Cincinnati, O.

The rolls are solid wrought-iron forgings, arranged in pyramid form, and have a capacity for bending plates up to 12 in, in width and ⅝ of an inch thick.

The lower rolls are geared together, while the upper or bending roll, is revolved by the friction of the plate in passing through. It is adjustable by power to suit the thickness of the plate and the radius to which it is to be sent. It has a hinged bearing at one end, which may be turned down out of the way, while the other end has a long shank extending to a third support, which retains the roll in position for the removal of rings or flues. This will be found a great advantage in boiler and other shops where plates are to be bent to a complete circle.



Midway between the housings a set of supporting rollers are placed to give additional stiffness to the lower rolls. For very long machines additional sets of rollers are added.

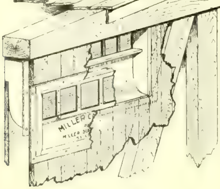
The machine is firmly tied together by a heavy cast-iron soleplate. It is very strongly geared, and all parts are made stiff and substantial.

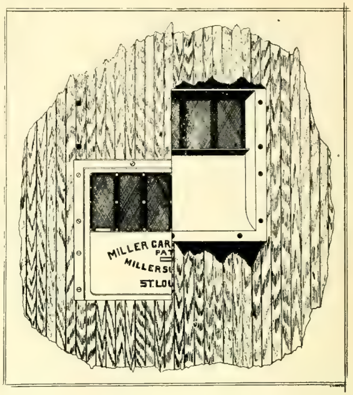
Suitable levers and clutches are conveniently placed for the quick and easy control of all the operations.

The machine is driven by an 18 horsepower reversable, constant-speed Bullock motor. For controlling the motor an automatic rheostat is used to prevent the operator from throwing on the full current too quickly and burning out the motor.

The Miller Car Ventilator

Ventilation of freight cars is admitted to be a necessity in which shipments of farm and dairy products are moved. The requirements of all satisfactory ventilating devices are briefly that they must be capable of being left open all the time, and yet protect the cargo from damage by rain, sparks, dirt and effectually secure it against theft. It is claimed that "the Miller Car Ventilators accomplish all this. They ventilate cars thoroughly, no rain, sparks, dirt or sunlight enters the car, and they are proof against theft. They can be left open during rain storms, yet no rain enters the car, so that the risk of railroads is not increased. They occupy no room available for any kind of freight; in fact, they avoid all cooperage and repairs now so common on ventilated cars, giving an ideal car for fruit, grain and all other commodities. The ventilators can be closed and sealed when





required. They are quickly and cheaply applied to cars under construction or cars already built. Simply cut a hole 12x18 in. in the siding, place ventilator in position and bolt in." The ventilation is accomplished by providing two openings for the passage in and out of air. The openings are not opposite each other as will be seen by a glance at the illustrations, the one on the outside of the car is the lower of the two. Air entering, even if laden with solid matter, in passing upward meets with a baffle plate which deflects the current and permits the solid matter to fall upon the curved surface of the inner wall of the ventilator and drop below the opening into the small space which may be seen in the sectional view. In this position subsequent gusts of air blowing in through the screen are not able to carry up again what has once dropped below the screen. Rain beating in through the lower screen follows the same course and finds its way into the space below, from which it drips out again.

The ventilator is a dust, dirt and spark trap, and its filtering action, if one may so say, insures pure, clean air always entering the car. It being open at all times, permits the air to carry off any exhalation which may rise from the farm products. The free circulation of air, however, keeps the temperature normal within the car and preserves the cargo sweet and pure.

The ventilator is also "burglar proof," because the openings are too small for a man to get in through them; they are too far out of line to permit of his fishing anything out, and even if the outer and lower screen were broken, it would be a difficult feat to break the upper and inner screen with any ordinary instrument, protected as it is from violence by the baffle plate. If both screens were broken it would be impossible to abstract anything from inside the cars, and even if this were not the case, it is very certain that the form of the ventilator would deny to the "enterprising burglar" a sight of what was in the car to steal. Altogether the Miller Supply Co., of 502 Houser Building, St. Louis, offers here a very attractive proposition to railroad and shipper, with corresponding disadvantages to the gentleman of predatory habits, which all three will not fail to appreciate. Mr. S. A. Crone is the Eastern representative, with office at 102 Chambers street, New York.

A locomotive built by the Schenectady Locomotive Works for the Pan-American Exposition has been equipped with an improved Michigan triple locomotive lubricator and automatic steam chest plugs. The engine is to be turned over to the Michigan Central Railroad after the exposition. Similar engines, by the same builders, for this road, have also been equipped with Michigan triple lubricators.

Car Foremen's Association of Chicago

The regular meeting of the Car Foremen's Association of Chicago was held in room 209, Masonic Temple, Wednesday evening, April 10. About 75 members were present.

The entire evening was devoted to the discussion of the following question: What is the proper method of procedure, both as to repairs and bill, in the following case: A car-owner finds one of his cars with a wrong pocket and wrong draft-spring; the car bearing a repair card reading, "One Gould coupler—broken." Owners procure a joint-evidence card, reading, "One wrong draw-bar pocket ¾ x 4 x 10," should be 1 x 4 x 10 ¾"; one 7" draw-bar spring, should be 8". Wrong attachments were on the coupler covered by the repair card.

It was decided that the proper method was to procure a joint-evidence card from the delivering line and then endeavor to locate the party making the wrong repairs—in this case the evidence being sufficiently strong to hold the party whose repair card was on the car for the Gould coupler, responsible for the wrong pocket and spring.

The parties applying the Gould coupler claim to have used a pocket of the same dimensions as the one on the coupler removed, and that they used the same spring. It was held, however, that they should have applied proper pocket and spring, and billed the owner for them, furnishing the owner a statement of the facts in the case, to enable him to locate the party making the wrong repairs, and that failing to do this they became responsible. It was further decided that in all cases where wrong parts are found adjacent to those that are being repaired, they should be made proper at the expense of the owner.

Largest Photo. of Handsomest Train

In connection with the famous "Alton Limited" train, the Chicago and Alton Railway has issued in pamphlet form a brief account of how a photograph which measures eight feet long and four and a half feet high came to be taken. When one comes to think of it four and a half feet by eight feet, if in bunting, would make a very respectable size for a flag on top of an ordinary building, and that is the size of the plate which was used to take the "largest photograph in the world of the handsomest train." The building of the camera was quite an undertaking in its way, but the best idea of its size may be gained by quoting a few words from the pamphlet: "In operation the camera is so constructed that after a long journey the plate may be adjusted in a unique manner. The holder is put in position, the large board, or front door as it may be called, is swung open, the operator, with a camel's hair duster, passes inside; the door is then closed and a ruby glass cap placed over the lense, the curtain slide is drawn and the operator dusts the plate in a portable dark room, after which the slide is closed and he passes out in the same way as he entered."

There is no account of any passengers having been included in this picture, but if there were any it is quite safe to say they were all "looking pleasant," not because they were being photographed, but because they were on the "Alton Limited." That is the fast day train between Chicago and St. Louis.

Why Steel Rails Break

In 1895 a steel rail on the Great Northern Railway, in England, broke into 17 pieces, causing a serious accident. A committee of the Board of Trade appointed to investigate the cause of the breakage has only recently made its report, after four years of work on the subject. The committee ascertained that the particular rail which broke on the occasion described possessed certain abnormal features, the precise origin of which remains undetermined, but the investigation led to several discoveries of scientific and practical importance. Among these is the surprising effect of cracks in the upper surfaces of rails. It was found by experiment that a rail nicked with a chisel to a depth of a sixty-fourth of an inch broke under a weight of 600 pounds falling from a height of twelve feet, while the same rail, not nicked, resisted the fall of a ton weight from a height of twenty feet.—Railway News.

BOOK REVIEWS

THE BIOGRAPHICAL DIRECTORY OF RAILWAY OFFICIALS.
Railway Age, Publishers.

This handsome book has 613 double-column pages and concisely records the railway career of almost 5,000 men. It is the fifth issue of the kind that has ever been undertaken, the first number having appeared in 1885. In 16 years the work has increased 337 pages and the number of names has increased 1,225. It is found that, of those whose names appeared in the volume for 1896, no less than 1,223 are now dead or out of the service, while the new volume has sketches of 1,344 officials who did not appear in the previous list. Of those who were in official position five years ago, probably more than 50 per cent. are now occupying different positions, and many of them have held several appointments in that interval. The chances and changes of railway official life are impressively shown in the brief statements of date and position which cover the official lives of many of those named.

The alphabetical arrangement of this volume brings all ranks of officials into juxtaposition, but examination will show that the great majority of names are those of general officers. A count discloses that these histories cover over 500 presidents and vice presidents, over 1,000 operative officers, general managers and superintendents, nearly 1,000 traffic officials—traffic managers, general and assistant general passenger agents, about 500 heads of motive power and car departments, some 300 chief engineers, and so on through less clearly defined grades of authority.

THE RAILWAY AGENTS' PURCHASING DIRECTORY.
Railway Equipment and Finance Company, Publishers, Indianapolis.

This book, of 442 pages, is the first issue of a proposed semi-annual publication designed to meet the requirements of railroad purchasing agents. It contains, in alphabetical order, a list of practically all material, appliances and supplies used for any purpose on railroads, each item followed by the names of manufacturers and dealers who can furnish the supplies. This list is apparently very complete, —nearly 380 pages of the book being devoted to it. Besides this there is a list of railroads giving addresses of the officials and an exhaustive index.

The book thus contains a vast amount of information in compact form, which has otherwise to be sought for through various sources.

It is not shown whether the book is sold at so much per copy or by subscription, or whether it is distributed gratuitously. It is of the convenient standard size—6 x 9 ins.—size and is substantially bound in cloth.

PNEUMATIC TOOLS.

The Standard Railway Equipment Company's latest catalogue contains a number of very clear half-tones, showing the various pneumatic tools which are made by this company. The catalogue is so arranged that any of the parts requisite for repairs may be easily ordered. On one page is a half-tone of each part separately numbered, and on the other page is the list of numbers, with the names of the parts. The numbers for each tool have a suitable prefix so that in telegraphing for a part, if the number and prefix survived mutilation at the hands if the transmitting company the meaning would be clear, though the description or name might be lost or unintelligible. The Monarch Holder-on appears to be a handy and satisfactory tool, and probably very superior to the ordinary dolly-bar usually employed. The Monarch pneumatic tools are made by the Standard Railway Equipment Company, of No. 210 Vine street, St. Louis, Mo.

Apollo Best Bloom

The American Sheet Steel Company has issued a new card 14x20 inches, upon which is tabulated information concerning Apollo Best Bloom galvanied sheets. The card shows the weight of sheets, number in a bundle and weight per bundle of galvanized sheets in all standard sizes and gauges, from No. 10 to No. 30, inclusive. The company will be pleased to forward copies of these cards to those who desire them. The advertising department should be addressed; offices in Battery Building, New York.

Record of New Equipment

Ordered during the Month of March 1901

CARS

Ordered by	No.	Class	To be built by
Am. Sheet Steel Co..	1	Flat.	Am. Car & Fdry. Co.
Anglo-Am. Prov. Co..	100	Refrig.	Own shops.
A., T. & S. F........	17	Chair.	Pullman.
" " "	15	Chair.	Own shops.
Buff., Roch. & Pitts.	500	Coal.	Am. Car & Fdry. Co.
Cal., Waco & Brazos.	290	Freight.	" " " " "
Canadian Pacific	55	Flat.	Own shops.
" "	10	Coaches.	" "
" "	6	Fruit Ex.	" "
" "	6	Bag and Ex	" "
" "	5	Flat.	" "
Chicago & Alton.....	10	Furniture.	Pressed Steel Car Co.
C., B. & Q..........	125	Coal.	Am. Car & Fdry. Co.
" " " "...........	250	Gondola.	" "
Cin., Rich. & Mun...	100	Box.	Laconia Car Co.
Colorado Midland	5	Chair.	Pullman.
" "	100	Coal.	Am. Car & Fdry. Co.
" "	100	Box.	" " " " "
Copper Range.......	20	Hop. Gon.	" " " " "
" "	10	Cars.	" " " " "
Delaware & Hudson.	700	Coal.	" " " " "
" " " .	250	Hopper.	" " " " "
" " " .	200	Box.	" " " " "
Det. & Mackinac....	150	Freight.	Barney & Smith.
Diamond Tank Line..	13	Tank.	Am. Car & Fdry. Co.
Elgin, Joliet & East.	50	Gondola.	" " " " "
Glucose Sug. Ref. Co.	15	Tank.	" " " " "
Great Northern	50	Coaches.	Barney & Smith.
" "	24	Coaches.	Am. Car & Fdry. Co.
" "	5	Dining.	" " " " "
H. J. Heinz Co.......	2	Cars.	Middletown Car Works.
Inter. & Gt. North...	1,390	Bx. & Coal.	Am. Car & Fdry. Co.
" " " ...	12	Chair.	" " " " "
" " " ...	6	Mail & Ex.	" " " " "
" " " ...	3	Baggage.	" " " " "
Ivory. & Mill Ck. Val.	81	Milk.	" " " " "
Lack. I. & S. Co....	12	Coal.	Pressed Steel Car Co.
Lake Sup. & Ish.....	100	Flat.	" " " "
Marq. & Southeast....	100	Flat.	" " " "
Mo. Kan. & Texas...	30	Passenger.	Am. Car & Fdry. Co.
Mo. Pacific	2,500	Box.	" " " " "
" "	6	Postal.	" " " " "
" "	6	Baggage.	" " " " "
Mo. Tie & Lum. Co..	25	Logging.	" " " " "
Morenci Southern ...	6	Hopper.	" " " " "
Nelson, Morris & Co.	25	Freight.	Own shops.
Northern Pacific	152	Stock.	Am. Car & Fdry. Co.
Penn. R. R..........	17	Combinatioı	Jackson & Sharp.
" "	6	Dining.	Am. Car & Fdry. Co.
" "	2	Dining.	Pullman.
Pere Marquette	500	Box.	Am. Car & Fdry. Co.
" "	100	Coal.	" " " " "
Pitts. & Buff. C. Co..	150	Coal.	Barney & Smith.
St. Louis & San F...	500	Box.	Am. Car & Fdry. Co.
" " " ...	5	Coaches.	" " " " "
" " " ...	4	Baggage.	" " " " "
St. Louis, Troy & E..	18	Ballast.	Rogers Ballast Car Co.
St. Louis, I. Mt. & S.	4	Postal.	Am. Car & Fdry. Co.
" " " .	6	Baggage.	" " " " "
St. Louis Refrig. Co..	75	Cars.	" " " " "
Southern Pacific	101	Ballast.	Rogers Ballast Car Co.
South. Mo. & Ark...	1	Coach.	Am. Car & Fdry. Co.
" " " ...	1	Coach & Sm	" " " " "
" " " ...	1	Comb.	" " " " "
Southern Railway ...	1,000	Hopper Bot.	Southern C. & F. Co.
" " ...	1,200	Coal.	" " "
" " ...	100	Stock.	" " "
" " ...	100	Coke.	" " "
" " ...	600	Vent. Box.	" " "
" " ...	400	Box.	" " "
" " ...	50	Refrig.	" " "
" " ...	5	Mail.	" " "
" " ...	500	Box.	Am. Car & Fdry. Co.
" " ...	250	Coal.	" " " " "
" " ...	100	Furniture.	" " " " "
" " ...	50	Ballast.	" " " " "
" " ...	2	Combinatioı	" " " " "
" " ...	7	Pass. (nar.)	Pullman.
" " ...	8	Pass. (wide.)	"
" " ...	5	Passenger.	Barney & Smith.
" " ...	50	Refrig.	Mt. Vernon Mfg. Co.
Tacoma & Eastern...	25	Flat.	Am. Car & Fdry. Co.

The Protectus Company of Philadelphia, of which Mr. W. C. De Armond is president, has introduced a protective coating for iron, steel and wood. Protectus is not a paint, but a liquid preservative made from a secret formula, and in this preparation is used a method of making mineral oil dry quickly after application. It is said that this has never before been accomplished. Neither fish, linseed nor substitute oils are used in the preparation, according to the guarantee of the company.

Four of the cars of Pressed Steel Car Company's make will be on exhibition at the Pan-American Exposition, painted with "Protectus."

LOCOMOTIVES

Ordered by	No.	Class.	To be built by
Buff. Roch. & Pitts..	3		Baldwin Loco. Works.
" " " " .	8		Brooks Loco. Works.
Calif. & Northwest...	2	10-wheel.	Richmond Loco. Works.
Chicago Junction	2		Shenectady Loco. Wks.
Ch., St. P., Min. & O	3		" " "
Georgia Central	5	Consol'n.	Cooke Loco. Works.
Inter. of Canada.....	10	Consol'n.	Richmond Loco. Works.
Inter. & Gt. North...	11	10-wheel.	Cooke Loco. Works.
Jamestown & Chaut..	1	10-wheel.	Brooks Loco. Works.
Kan. Ft. S & Mem...	20		Pittsburgh Loco. Wks.
Lehigh Valley	5	Atlantic.	Baldwin Loco. Works.
" "	8	Com. Con.	" " "
" "	2	10-wheel.	" " "
" "	2	Switcher.	" " "
Norfolk & Western..	10	Consol'n.	Richmond Loco. Works.
Penn.	20	Mogul.	Baldwin Loco. Works.
"	2		" " "
Peoria & P. Union...	1	Switcher.	Brooks Loco. Works.
Quebec Southern	1		Baldwin Loco. Works.
Southern	10	10-wheel.	" " "
"	25	Consol'n.	" " "
St. Louis & San Fr..	5	10-wheel.	Dickson Loco. Works.
St. Louis Transfer...	10	Consol'n.	" " "
Southern Pacific	103	Van. Com.	Baldwin Loco. Works.
Texas & Pacific......	25	—	Cooke Loco. Works.
Tionesta Valley	1		Brooks Loco. Works.
White Pass & Yukon.	2		Baldwin Loco. Works.

In the course of a lecture by Mr. Vauclain, at the February meeting of the New England Railroad Club, he spoke as follows of the Vanderbilt boiler: "Just at the close of the century we have successfully introduced what is known as the Vanderbilt boiler. The abolition of stays, etc., is a great advance, but three or four years must elapse before the conservatism of our motive power departments will permit its acceptance. This boiler was designed and introduced by Cornelius Vanderbilt, and gives great promise for the future. The rapidity with which the fire-box can be renewed and the absence of usual repairs on a locomotive commend it. The fact that the boiler has been introduced and promoted by Mr. Vanderbilt is perhaps somewhat of a handicap, as were it a Brown boiler, or a Smith boiler, it might receive more prompt recognition."

The The J. S. Toppan Company, of Chicago, general railroad supply agents and railroad representatives of the Kennicott Water Softener Company, also of Chicago, have opened offices at 26 Cortlandt street, New York City.

Mr. Alexander Holland, treasurer of the company, who has charge of the Eastern and Southern business of the Toppan Company, is in charge.

It is said that rapidly growing business in the East is responsible for the move.

Mr. Robert Spencer, now of Philadelphia, for many years well known in the railroad service of this country, has associated himself with Julian L. Yale & Co., of Chicago, and will have charge of the Eastern business.

Sterlingworth brake beams have been specified on 2,750 cars just ordered by the Southern Pacific Railway Co.

Sterlingworth Railroad Steel Trucks and Body Bolsters have been specified on 1,000 80,000-lbs. capacity cars for the Southern Railway Co.

The Cold Blast Tranportation Co. is in the market for 100 or 200 refrigerator cars.

Miscellanea

The Corning Brake Shoe Company has contracted for the enlargement of its Corning plant. The work is to be completed in June, and will double the capacity.

The Kindl Car Truck Company will remove its offices from 1445 Old Colony Building to 920-921 Merchants' Loan and Trust Building. The company handles the Kindl car truck and the Thornburgh coupling attachment.

The New York Central Car Shops, at East Rochester, N. Y., were totally destroyed on April 18, by a fire supposed to have been caused by strikers. The loss will reach over $100,000, which is offset by an insurance amounting to a little over half. The shops had been closed for a week or more on account of a strike of the employes.

RAILROAD DIGEST

Formerly The Railroad Car Journal

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EDWARD A. PHILLIPS GEORGE S. HODGINS, Editors

Vol. XI JUNE, 1901 No. 6

The Electric Locomotive and the Third Rail

The modern electric locomotive which does not make use of the "trolley," has to perform a duty which the trolley car does not "Watt" of. The third rail lies beside the line, dormant and inert. The business wire with current from the power house is well out of harm's way in a vitrified conduit, under ground and reaches the "third rail" only at each section, but is prevented from electrifying it, by the fact that the live wire and the 'third rail" are separated, on each section, by a switch. When this switch is closed the current enters the section of rail upon which it lies, and it becomes charged with current, which then passes through the contact shoe and reaches the motor. The electric locomotive has, briefly, to close this switch in every case as it runs merrily along, or it simply cannot proceed. It has one or two ways of performing this feat. If the switch is magnetically operated, the locomotive has to generate electricity enough, by an air-operated motor, or otherwise to charge the third rail weakly, but just sufficiently to close the switch and the third rail instantly becomes charged from the power house. The locomotive may, as in some systems, impart a slight motion forward and inward to the "third rail," enough to close the switch and draw from the power house the current which then flows from the live wire to the third rail. The locomotive which feeds upon a "third rail," in any system only requires to have enough vital energy, so to speak, to turn the key in the lock and the door flies open. In passing through the door it gets a copious draught of a sort of electrical "elixir of life," which gives it vigor to rush on to the next door, turn the lock, again drink of the life giving stream and speed on. The modern up-to-date third rail electric locomotive has abandoned the "live wire" because being a "Subscriber" and "Constant Reader" of the *Electrical Review*, it knows that the electric current does not kill, and therefore it has no desire to have people knocked down, and rendered temporarily insensible when it might be miles away and have no share in the proceedings. The electric locomotive says to itself "If I can't run over a man, fairly and squarely myself, I won't bother with him at all." The locomotive which thus relies in a manly sort of way, solely on its own powers, only electrifies a short section of rail ahead of it, and "de-electrifies," if we may so say, each section behind it, in rapid succession, so that the line behind it and any respectable distance ahead of it, is "*dead*," and may be walked over, driven over, touched, or sat upon by mankind in general without anything happening. The only thing the "third-rail-locomotive" says is "If you get on the track ahead of me, so close that you will be run over anyway, you'll be electrified into the bargain, but it won't matter much then. So here goes."

The Locomotive Dispute in Great Britain

In the House of Commons on May 23 Sir Alfred Hickman, Conservative member for Wolverhampton, West, and formerly president of the British Iron Trade Association, attacked the Government for having bought American locomotives and bridges for India. Lord George Hamilton, Secretary of State for India, was not in the House at the time, but replied very fully in a letter, in which he told some wholesome and at the same time very unpleasant truths. "You seem to think," he says, "that orders have only gone abroad because those who gave them did not understand their business. I wish it were so. The competition we have to face is founded upon something much more formidable and more substantial—chemical research, the concentration of capital, thorough technical education, and improved industrial organization have made in recent years a greater advance in America than here." Lord George Hamilton practically told the British public that, other things being equal, the government would give the preference to British manufacturers every time. The comments of the press on the subject are very interesting. The *St. James Gazette* applauds the Secretary's "crushing brutal frankness," and criticizes what it calls the "You-be-damned" attitude of British manufacturers toward their customers. The *Gazette* even regrets Lord George's assurance that where possible, preference will be given to home firms. It censures the methods of the British trade unions, and would be glad to let them all learn the bitter lesson by experience. The *Times* says: "It is a satisfactory defence of the Government, but unpleasant reading for all concerned in the maintenance of British Industrial supremacy. Probably the American firms who accepted the Atbara and Gohteih viaducts were as 'full' as their British competitors, but they would not admit the fact or suffer it to enter into their calculations."

The *Globe* predicts that unless the methods of the trades unions are modified the British will be beaten out of the field. It compliments American unions on their good sense in fostering skill and industry while keeping up the rate of wages.

Sir Alfred replied by letter to Lord George Hamilton at some length, and makes some serious charges. He quotes from the report of the Burmah Railway for the first part of 1900 to show that American locomotives burned 35 per cent. more fuel per train mile, and 23 per cent. more per car mile than the British-built engines. He has asked for a committee to investigate his charges.

The *Daily Mail* defends American locomotives, and asks for further evidence concerning the Gohteih viaduct. It considers the fact that British firms are obliged to refuse orders, not as a sign of prosperity, but a sign that they fail to keep sufficient stock.

The *Daily Chronicle* says: "As Sir Alfred Hickman points out, British trade is looking after itself extremely well. However, he proves too much, because, if British firms are full of business, where is his grievance? It seems that what really fills him and others like him with alarm is the fact that British trade paramountcy is threatened. We must admit that this paramountcy is doomed, but the anxiety on the subject is quite sentimental."

The tone of the press criticism is adverse to the British manufacturer and severe on the short-sighted action of the English trades unions.

It will not be the fault of British leader-writers if the nation is not aroused to action of some kind. In this connection a paragraph in Mr. Isaac N. Ford's cable letter to the New York *Tribune* a few days ago is significant. He says: "Many things are going on in Germany and England which make less noise than the alleged Americanization of the London underground traction, but are more important. American combinations of railway, steel and shipping interests have produced a profound impression and promoted thought among English and German capitalists. Germany as the more imitative country is likely to be first to meet combination by combination; England, as the more conservative country, will move more slowly, but in the same direction. The American challenge is not passing unheeded in either country, but the men working out the problem are not shouting on the street corners."

The Behavior of Trucks on Curves

The paper read by Mr. F. F. Gaines, Mechanical Engineer of the Lehigh Railway at the May meeting of the New York Railroad Club, was very suggestive and provoked a good deal of interested and interesting comment. The behavior of truck-wheels in passing round curves was touched on by several speakers. One of them believed that the outer and higher rail was exclusively the recipient of flange friction from a passing train. Another asked why, if that was the case, should the inner and lower rail of a certain curve which he had inspected, show signs of wear due to flange friction? It was very facetiously explained by a third speaker that the rails said to be so worn must have been previously flange-worn, and subsequently introduced into the main line of the Standard Railroad of America. The subject is, however, very interesting and the Railroad Digest would therefore invite attention to three cases which may often, and certainly at times, do occur:

First,—Suppose a long freight train moving at high velocity on a tangent, enters a curve with steam shut off; in other words, it drifts. The momentum of the train carries it around the curve and the flange of each leading wheel of every truck runs hard against the outer and higher rail of the curve, the trailing wheel of each truck runs round the curve normally, and probably much as it would do on a tangent.

Second,—Suppose the same train stopped on the curve, so that the engine is just about leaving the curve and the caboose is just entering it. If the engine moves forward the leading wheel flanges of each truck at the forward end of the train, will run hard gainst the outer and higher rail, the wheel flanges of the leading wheels of the cars near the centre of the train, will probably run against the inner and lower rail of the curve, and this tendency to hug the inner and lower rail will shade off gradually toward the rear of the train, so that the caboose and probably several cars adjacent, will run practically as if on a tangent. In this case the train has no momentum to speak of, and its effort would be to assume the position of the chord of that portion of a circle included in the curve.

Third,—Suppose the same train moving at high velocity as in the first case, but pulled by the engine working steam, all the way round the curve. The momentum of the train tends to produce the same effect as in the first case. It does so, but the flange friction of the entire train against the outer and higher rail is reduced by the effort of the train to straighten out and form a chord of the curve, due to the pull of the engine.

It is therefore very much a matter of velocity, whether the outer and higher rail shall be hugged very hard, or whether it shall not. If the velocity is sufficiently high, the outer and higher rail will be hugged exclusively by the flanges which deflect the trucks, their pressure against it being always reduced somewhat by the obliquity of traction, though at fast speeds this reduction would not be sufficient to cause any actual flange friction on the inner and lower rail. As the speed reduces, the tendency to hug the inner and lower rail increases, in, perhaps, the middle and following cars, because with slower speed, momentum is less; and at some—yet to be named—slow speed, the conditions would approximate very closely to those assumed in the second case.

The cause of wear on the top of the inner and lower rail, is no doubt due to the slipping of the wheels which run upon it, owing to its shorter radius, but as Kipling would say, "That is another story."

The case presented, in which one speaker claimed exclusive flange friction for the outer and higher rail, and the testimony of a gentleman who averred that he had seen evidences of flange wear on the inner lower rail, and the position which we, in all humility, have ventured to assume in this matter, may possibly be aptly described by taking the words temporarily out of the mouth of Pish Tush, in Gilbert and Sullivan's comic opera, *The Mikado*, where he says:

"And you'll agree, as I expect, that he was right to so object,
"And we are right, and you are right, and all is right as right can be."

FIRST AID TO THE INJURED IN RAILROAD WORK—II

WHAT OUR RAILROADS ARE AND ARE NOT DOING TO PROVIDE FIRST AID TO THE INJURED

We give this month a few more replies received too late to appear in our May number.

To show the interest taken in this matter in Great Britain, we can hardly do better than to direct the attention of our readers to the accounts of the ambulance competitions which have recently taken place among the employes of the North British Railway, also among those of the Carlisle Joint Ambulance class, and the competition for the Maier's Railwaymen's Challenge cup, held at Ayr. These appear in the Digest under the head of Medical and Surgical Matters.

In these competitions, various teams, each composed of five men, take part, and the exercise consists of a practical demonstration of treating the injured, transport of the injured, and an oral examination. The men bandage, carry, or otherwise "revive" a subject, in the proper manner for the particular accident designated by the umpire. In this work competition is very keen and prizes are awarded to the first three teams which are adjudged to be the most skillful. The team standing at the head of the list is usually accorded the additional distinction of representing its own railway, in the annual national competition between various railways. The officers of the companies are always present at the competitions and evince a marked interest in the work. There has not been, so far as we know, any competition among those instructed in First Aid in this country, but there is great interest taken in the subject by many railway officers and surgeons and it may yet come to pass that competitions among teams in ambulance work will be taken up on this side of the Atlantic.

The manager of the Western Lines of the Canadian Pacific Railway writes, "The company have surgeons located at all divisional points, who look after any persons who may be injured, but we have made no provision for First Aid except in our workshops. Some years ago our Chief Surgeon gave some lectures to the employees at Winnipeg along this line, but very little interest was taken by the employees, and since then we have done nothing in the way of instructing trainmen, or supplying them with First Aid appliances, although, I certainly think some attention should be given to this important work. As stated, no particular steps have been taken to instruct our trainmen, yet in our book of Rules and Regulations we give a number of instructions for the care of injured persons."

The vice-president and general manager of the Campania Limitada del Ferrocarril Central Mexicano, says: "This company has a medical department, with local surgeons located at all divisional points as well as in the larger cities, besides modern hospitals at convenient points. The rules issued by the management governing said hospitals and medical department also contain certain instructions with reference to care and attention necessary in case of injury."

The General Superintendent of the Rio Grande Western Railway says: "We have supplied all cabooses on freight trains, and we carry in the equipment box of passenger cars, what is termed an 'emergency chest,' in the top of each of which is pasted a circular of instructions, a copy of which is herewith enclosed."

The General Superintendent of the Norfolk and Western Railway says: "The company does not provide emergency cases on trains." He forwards copy of rules issued by the Surgical Department. The circular referred to gives the names of upwards of sixty-four regularly appointed surgeons who are situated at various points along the line. It gives also the rules to be observed regarding the employment of the company's surgeons. A page is devoted to instructions, telling how to

deal with an injured person until surgical assistance has been secured. How to treat cases of bleeding, broken bones, shock, etc., etc., are briefly set forth.

The General Superintendent of the St. Louis Southwestern Railway of Texas writes: "We keep a supply of surgical dressings at all of the important stations, shops, wreckers, private cars, etc., on the lines, together with instructions regarding their use. We also have the usual surgical organization common to western roads, which consists of a general hospital, division surgeons at terminal points and the usual corps of local surgeons at various points along the line."

The General Manager of the Southern Pacific says: "In all our limited trains we carry emergency cases which are placed in charge of employees who are from time to time given instructions as to the use of the contents and as to the best method of rendering First Aid to the sick and injured. We also provide employees at a good many stations, where there are no surgeons, with emergency cases containing such supplies as could be used by laymen in rendering First Aid to the sick and injured until a physician and surgeon can be reached. Accompanying each case is a list of contents with printed instructions as to their use. In addition we have a very complete provision for prompt professional service. The lines have been divided, first into divisions, with a Division Surgeon over each, and then into districts with a Division Surgeon for each district. District Surgeons take charge of all the sick and injured within the limits of their respective fields. Further, at every station where there is a physician and surgeon in practice, we have what are termed Emergency Surgeons, who render first or emergency treatment in cases of sickness and injury, and who transfer such cases as require further or after attention to either the District Surgeon or to the nearest of our hospitals. At all points where we have District Surgeons we have Emergency Surgical Cases containing a supply of surgical dressings and appliances ready for immediate use. In addition, stretchers of various kinds with full equipment in the way of blankets, etc., are kept at regular intervals along the lines."

The General Manager of the Union Pacific encloses circular issued by that company April 30, 1900, relative to the organization of an association for the purpose of furnishing employees with instructions in First Aid to the Injured.

The circular is as follows: Believing that much suffering may be prevented by employees being conversant with the proper course to be pursued in rendering immediate temporary relief to injured persons in emergency cases where surgical aid is not quickly available, it has been decided to perfect an organization under the jurisdiction of the Surgical Department for the purpose of furnishing systematic instructions on the subject, the members of which will be able to act in a competent and practical manner when the necessity arises. A general idea of the plan is outlined below:

The object of the Association will be to render immediate aid and assistance to employees, passengers and others who may be injured (or become suddenly ill) while on the premises of the company.

Classes will be formed and free instructions given by a properly qualified surgeon.

The company will furnish materials free of charge.

A lecture course, comprising five lectures on "First Aid to the Injured," will be given at convenient points and at such intervals as may be considered most suitable.

Ambulance and Transport Corps composed of members who have attended the regular course and passed a satisfactory examination, will be organized at convenient points.

It is earnestly hoped and desired that employees in all departments will take an active interest in this work by joining the classes, attending the lectures and studying the Manual of Instructions which will be furnished to each member of the Association, and thereby acquire a knowledge that will enable them to render valuable and efficient aid to suffering humanity in emergency cases.

The following interesting letter on this subject from Dr. Bruce L. Riordan, of Toronto, Canada, shows that the practical application of First Aid principles is receiving serious attention at the hands of that important and influential body, the International Association of Railway Surgeons:

Editors RAILROAD DIGEST:

I have read with great interest, your article on First Aid to the Injured in Railroad Service. It should help to stimulate interest in this very important subject.

In the Grand Trunk Railway service at Toronto we have had classes of employees instructed in First Aid principles, following the course of instruction laid down by the St. John's Ambulance Association of England. The majority of the members of the classes have gone through the examination prescribed and have gained the Certificate of Competency awarded by the St. John's Ambulance Association.

I personally organized these classes, the first one, about ten years ago and gave the necessary lectures and demonstrations; and I am pleased to say that I could not wish for more willing or enthusiastic students than the railway employees of all the different departments. The attendance was entirely voluntary. I enclose you report of First Aid Committee of the International Association of Railway Surgeons.

In my address as President of the Association which I had the honor to present to the Association at Richmond, Va., May, 1899, I recommended that the I. A. R. S. take up the work of First Aid as one of the special fields where the Association might do useful work—helpful alike to the railway employees and useful to the railway employees—by lessening suffering and saving expense. Surgeons know, and the public are commencing to realize that a large wound may not be serious if it is not infected, while a small wound, if infected, may lead to the most serious or even fatal consequences. First Aid teaches how to avoid infection—It does not aim at doing more than its name implies—it is the opposite of meddlesome interference and does not aim at usurping the functions of the Surgeon. It has been found by experience that to impart a practical knowledge of rendering first aid in accidents—lectures by regularly qualified medical men—each lecture to be followed by demonstrations on members of the classes, have given the best results.

Small hand books which give the text of the lectures are also most useful, as they may be referred to to refresh the memory and keep up interest in the course of lectures. The course prescribed by the St. John's Ambulance Association of England has been found satisfactory and practical. It consists of the attendance upon five lectures, each of one hour's duration, with an interval of one week between lectures. After each lecture half an hour's practical demonstration on such subjects as the handling of persons who have received a fracture—the arrest of bleeding—resuscitation of the apparently drowned or suffocated, the application of bandages, &c.

BRUCE L. RIORDAN.

Following is the report referred to in the foregoing letter:

REPORT OF THE COMMITTEE ON FIRST AID

Mr. President and Members of the International Association of Railway Surgeons:

Gentlemen:—As chairman of the First Aid Committee, appointed at our last annual meeting, held at Richmond, Va., I would report that your committee begs to make the following recommendations:

First—That a book of instruction in First Aid principles for railway employees be compiled and published under the auspices of this association, and sold through the first aid department of the I. A. R. S., hereafter to be established, and that arrangements be made for the supply of materials, such as charts, illustrated bandages, etc., for demonstrating to classes of instruction.

Second—That a circular be published giving details as to mode of organizing First Aid classes of instruction among railway employees, including a syllabus of five lectures and instructions to the lecturers and examiners of these classes.

Third—That a certificate of competency in First Aid be issued by this association, to be presented to those employees who pass a satisfactory examination after they have taken the prescribed course.

Fourth—That a standing committee be appointed, whose duty it shall be to further the teaching of First Aid principles to railway employees throughout the countries now covered by the working of this association.

Fifth—That the sympathy and co-operation of the various railway managements be enlisted in extending to their employees the knowledge of First Aid principles.

BRUCE L. RIORDAN (Chairman),
C. R. DICKSON, (Secretary).

BOGIE TRUCKS FOR ELECTRIC RAILWAY CARS—II

By George L. Fowler.

(Continued from page 176.)

The Bemis Car Box Company also builds another truck, shown in Fig. 7. The difference between the two lies mainly in the arrangement of the springs. The longitudinal semi-elliptic spring is dispensed with and the transoms are fastened directly to the wheel pieces. The bolster is carried by a nest of four helical springs at each end in the same manner as in the common designs of

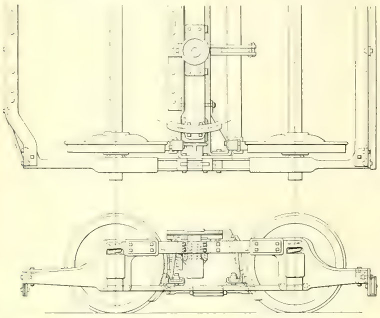


FIG. 7—TRACTION MOTOR TRUCK BY THE BEMIS CAR BOX COMPANY

diamond trucks. The frames are carried on pedestal springs that serve to relieve the parts of the direct jar from the wheels. Such a truck is strong, light and inexpensive to construct, but it is not at all likely that it will give the same ease of motion as where more care is taken in the spring suspension. It is becoming more and more difficult to secure good riding of electric cars on account of the rapid increase in loads and speeds.

In Fig. 8 we have a truck that is very extensively used and which is made by the Peckham Manufacturing Company, of Kingston, New York. Like the Bemis truck, described in Fig. 5, this also is carried by a triple series of springs between the body and the wheel.

The bolster is formed of two flat plates set on edge and carried at their extremities by a casting that forms a spring casting to attach the bolster to the semi-elliptic spring. In this casting and concealed so as not to appear in the drawing, there is a buffer spring to limit the lateral motion of the bolster. The side framing is a steel casting that is made with pockets for the reception of the pedestal and hanger springs. The transoms are angles bolted to the side framing and serving, with the end angles, to hold the truck in alignment.

The method of spring suspension is peculiar and remarkably efficient for the ease of motion which it gives to the car. The semi-elliptics at each side are carried by spring-supported hangers. These consist of an eye-bolt with a pin through the upper end that rests upon a spring cap, whose spring sets in a pocket in the side frame. At the lower end there is a toggle with jaws at right angles to each other. By means of this combination, the bolt carrying the end of the semi-elliptic spring always remains in a horizontal position regardless of the amount of sway of the car body. The motion is also freely yielded to by the eye-bolt which is free to swing transversely on the pin through its upper end. The longitudinal extension of the semi-elliptic spring is taken up by a slight distortion of the helical spring in the frame.

Axle-box springs complete the series in the spring suspension. The motor support is carried in practically the same way as in the McGuire truck. That is to say, the support has a spring resistance, no matter which way it tends to move. In fact, this may be regarded as the standard method of carrying the electric motor. It is a simple adaptation of the old buffer springs, that have been a characteristic feature of American railway cars, "and the memory of man runneth not to the contrary." It will be seen that these trucks are remarkably simple in construction and that they can be built very substantially and with an exceedingly short wheel base, that in the engraving being but 4 ft.

The motors are hung outside the wheels; thus, in some instances securing advantages that will be referred to later.

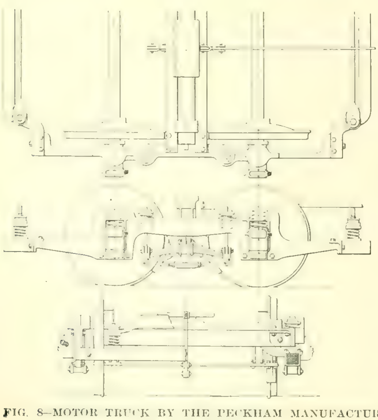


FIG. 8—MOTOR TRUCK BY THE PECKHAM MANUFACTURING COMPANY

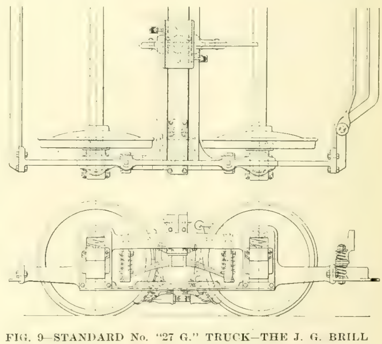


FIG. 9—STANDARD No. "27 G." TRUCK—THE J. G. BRILL COMPANY

A similar truck, though one varying somewhat in detail, is that shown in Fig. 9, and is made by the J. G. Brill Company, of Philadelphia. Here, too, the side framing is in the form of a steel casting and there is a triple series of springs between the body and the wheel.

The bolster is formed of two flat plates of metal that are the compression and tension members formerly so common in ordinary practice. The ends of this bolster project out beneath the side frames and are bolted directly to the semi-elliptic springs. From this point a U-shaped yoke rises, straddling the frame, to carry the side bearings.

As in the case of the Peckham truck, the ends of the semi-elliptic springs are themselves supported from the frames by a spring suspension, but of an entirely different construction. These links are formed of bolts having a ball head resting in a socket in the frame. These bolts run down through a helical spring and carry the latter's spring seat. These springs are surrounded by a stirrup on the lower end of which the semi-elliptic spring rests.

It will be seen from this that the hanger has the spring within itself and that it is free to assume any inclined position on account of the ball and socket connection at its upper extremity. At the same time it will also be noticed that the lower end of the stirrup must also incline to the horizontal or else put a torsional stress on the semi-elliptic or helical spring within it. This stress serves as a partial check to the lateral motion of the car, which is actually limited by a spring set in a pocket in the side-bearing yoke and which strikes against the inside of the side frames. The third spring of the series is the regulation axle box spring.

The truck is held in alignment by the transoms and end pieces, all of which are angles, riveted to suitable brackets cast on the frames.

The brakes are carried on beams with levers arranged so as to interfulcrum the shoes. The live lever is pivoted to one beam and is connected at its lower extremity to the lower end of a dead lever on the other beam.

Up to this time the consideration of these trucks has been limited to those whose construction very closely resembles the practice on steam roads, in so far as the arangement of the wheels and the distribution of the load is concerned. The wheels are of the same diameter and the weight is equally distributed over them all.

Attention has already been called to the fact that one of the principal objects which it is the aim of the designers of this class of truck to achieve, is to keep the car body as close to the rails as possible. With a four-wheeled car no great difficulty has been experienced, but where bogie trucks are used, a different problem presents itself. In rounding curves the truck must turn beneath the car body, and the sharper the curve the greater will be this angularity of motion. Hence it is evident that if the sills be low and close together they will be struck by the wheels in this curving motion. The result is that with trucks like those previously described, the sills must ordinarily be placed above the tops of the wheels.

It was in order to avoid this difficulty that the maximum traction truck was designed. In this type of truck the wheels are of different diameters and the center plate is not midway between the two axles. The result of this method of construction is twofold. As the center plate is placed nearer the axle of the larger wheels, it puts a greater weight upon them than upon the smaller, and as the tangent to the radius drawn from this center to the large wheels is nearly parallel to the sills, these wheels can run around curves of the sharpest radius without, in any way, interfering with the structure of the body of the car. At the same time the lateral swing of the small wheels is greatly increased. Their diameter, however, is usually only about 20-in. so that they are well below the sills, in any event, and this wide range of motion interferes with nothing. These small wheels are almost invariably so placed beneath the car that they are towards the center while the large wheels are towards the end.

The proportion of the total weight of the car carried by the large wheels, which are used as driving wheels, ranges from 65 to 75 per cent., dependent upon the location of the bolster and the method used in suspending the motor.

This type of truck makes it possible to keep the car body down as low as the construction of the motor and the proper clearances for the same will admit, and thus

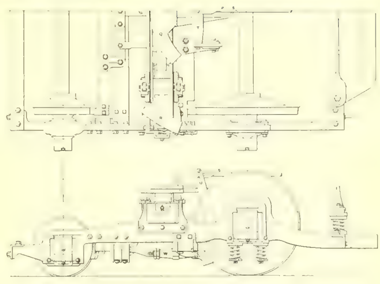


FIG. 10—TRUCK BY THE PECKHAM MANUFACTURING COMPANY

greatly facilitates the rapidity of ingress and egress of the passengers.

In Fig. 10 there is shown trucks that are made by the Peckham Manufacturing Company. In this truck not only is the center of the bolster near the larger wheels, but the center of motion is carried nearer still. This increases the weight on the large wheels above that on the small ones and so reduces the lateral swing of the former that it is inappreciable. The weight is not carried at the center of motion at P, but upon the extended swiveling plate Q, which rests directly upon a semi-elliptic spring which is, in turn, carried by the bolster. The bolster is slung by ordinary hangers from above, that are pinned to castings which rest on helical springs, carried on the side framing. The latter may or may not be supported by axle-box springs. As in the case of the other Peckham truck, the side frames are of steel castings, held square by angle end pieces and transoms firmly bolted to suitable brackets on the frames. A peculiarity of this truck is to be found in the motor suspension. It rests as usual, upon the axle with the nose carried at the outer end of the truck. This method of holding it has the advantages of throwing the whole weight of the motor and more on the driving wheels, of placing the motor outside the wheels where it is readily accessible, and of making it possible to bring the bolster much nearer the large wheels than is possible where the motor lies between the axles. This, of course, serves to increase the proportion of weight that is carried by the large wheels.

One of the peculiarities of this truck is also to be found in the arrangement of the brake mechanism, which is not clearly shown in the engraving. This consists in so adjusting the leverages that no matter how much brake pressure may be applied to the large wheels, that put upon the small ones is limited to a certain definite amount.

The pull rod S, takes hold of the center of the equalizer T, and through it moves the upper end of the live brake lever U. The middle connection of this lever takes hold of the brake-beam, carrying the shoes for the large wheels. The lower end through the compression connection W, is attached to the beam of the small wheel. This can be so arranged when desired that a spring is interposed between it and the beam or shoes on the small wheels. Then, after it has moved through a certain predetermined distance, it strikes against a stop fastened to the truck frame, which forms a rigid fulcrum for the application of the shoes on the large wheels. The result of this combination is that the pressure upon the small wheels is always limited to that which the tension of the spring exerts, while that on the large ones is applied to the pull-rod P. In this way the braking resistance can be increased with the load and that without incurring any danger of skidding the small wheels, which would not be the case were it possible to increase the brake pressure upon them indefinitely.

This is shown in Fig. 11, which is another design of truck made by the same company.

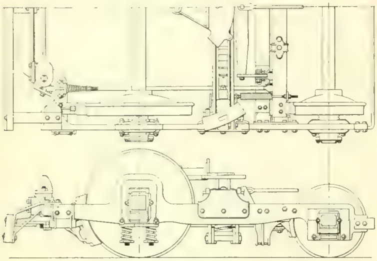


FIG. 11—MAXIMUM TRACTION TRUCK BUILT BY THE PECKHAM MANUFACTURING COMPANY

The St. Louis Car Company, of St. Louis, Missouri, also builds a maximum traction truck like that shown in Fig. 12. The framing is formed of two flat bars set on edge and extending entirely around the truck. They are separated at the sides, but are riveted together face to face at the ends. The bolster is of wood, with flitch plates and rests on elliptic springs carried on a spring-plank hung from the transoms by ordinary hangers. It plays up and down between two castings, shaped like angle brackets bolted to the side frames. The pedestal springs are much longer than in any of the other trucks described and rest upon stirrups riding on the axle box, like one of the old horse cars of a dozen years ago. The length of these springs coupled to the elliptics should give an easy motion to the car.

The truck is light and should be inexpensive to construct and the principal objection to it would be found in the fact that the framing is beneath the axle boxes, so that it must be dropped down in order to get the wheels out. There is also some objection to the carrying of the weight as it is here, but the objection is not serious.

There is a somewhat greater side travel to the driving wheels of this truck, than in the case of the Peckham, owing to the fact that the center of swing is on the center of the bolster itself, instead of being carried out toward the axle of the driving wheel by a special center plate. The brake rigging is of the simplest type. The live lever

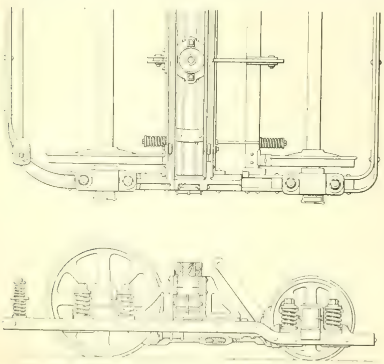


FIG. 12- MAXIMUM TRACTION TRUCK BUILT BY THE ST. LOUIS CAR COMPANY

is directly attached to the brakebeam of the small wheel and, by a compression rod, to that of the large wheels. There is apparently no provision, as in the Peckham truck, to limit the shoe pressure on the small wheels, other than by the tensions of the retracting springs that serve to throw back the beams when the pull on the brake lever is relieved. The method of motor suspension is identical with that used on trucks previously described and is outside the wheels as in the Peckham truck.

Fig. 13 illustrates a design of maximum traction track that is built by the J. G. Brill Company, of Philadelphia, Penn. As in the case of the Peckham truck the frames are of steel castings stayed and held square at one end by a strong T and at the other by a flat brace X. The alignment is still further insured by triangulation, by the use of the diagonal brace J. One of the peculiarities of this truck is the absence of the bolster. The whole weight of the car body is carried on the side bearings, whose center of curvature is at an imaginary pivotal point a 6-in. from the center of the large axle. The car body is further guided about this point by the pin Z, which is attached to the car body and moves in the slot of the link at A, whose center is also at the pivotal point.

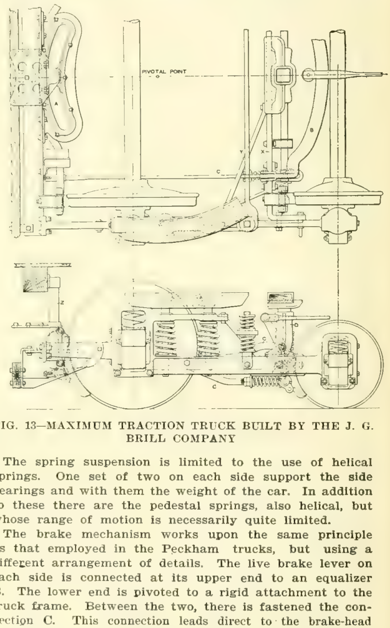


FIG. 13—MAXIMUM TRACTION TRUCK BUILT BY THE J. G. BRILL COMPANY

The spring suspension is limited to the use of helical springs. One set of two on each side support the side bearings and with them the weight of the car. In addition to these there are the pedestal springs, also helical, but whose range of motion is necessarily quite limited.

The brake mechanism works upon the same principle as that employed in the Peckham trucks, but using a different arrangement of details. The live brake lever on each side is connected at its upper end to an equalizer B. The lower end is pivoted to a rigid attachment to the truck frame. Between the two, there is fastened the connection C. This connection leads direct to the brake-head of the large wheels. Midway between the ends the rod forks and the lower branch leads to the small wheels. Here the end is attached to a spring by which the small brake shoe is applied. The brake shoe on the large wheel serves as a fulcrum for the whole system, and the lever can move only so far as the wear of this shoe will permit it. The pressure on the small wheel is, therefore, limited to the tension of the spring bearing against its brake head. Adjusting nuts make it possible to fix this at any point that may be desired.

Attached to the end pin near the small wheels there is a standard D, with a spring attachment for holding the

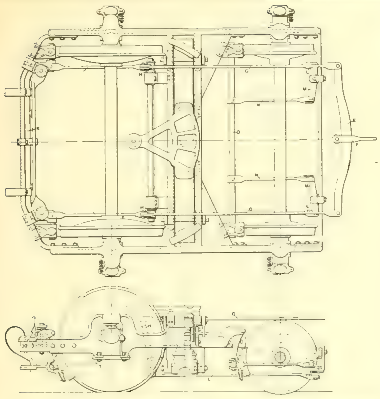


FIG. 14—MAXIMUM TRACTION TRUCK BUILT BY THE McGUIRE MANUFACTURING COMPANY

small wheels down on the rail when there is â tendency on the part of the motor to lift them, as always occurs on the front truck, with the small wheels toward the center of the car.

The motor is carried on the axle and on a motor support in the usual manner.

The last truck to which attention will be called is the maximum traction truck shown in Fig. 14, which is made by the McGuire Manufacturing Company. As in the case of the other trucks built by this company, the whole frame including the transoms is cast solid in one piece. The same device is that used by the Peckham Company for throwing the center of motion out near the driving axle, while the weight is carried on the bolster. The bolster is of steel and is carried by a combination of elliptic and helical springs.

The brake mechanism of these trucks is somewhat peculiar. The power is applied to the center of the equalizer E by the stirrup F. The pull is transmitted through the rods GG, to the upper end of the brake levers HH. These levers are pivoted on a bracket attached to the transoms. Between the pivotal point and the upper end, there is attached the pull rods II that lead out to the brake-beam K, of the large wheels. To the lower end of the brake-beam there is fastened the pull rods LL, that come back to the outer ends of the levers MM, which are pivoted on the end pieces of the frame. Connections NN, from the other end of these levers carry the pull to the brake-beams of the small wheels. The brake-shoes are not interfulcrumed, and the pressure on one set of shoes is limited by the wear of the others.

The trucks present a fine example of what can be done in the way of the casting of steel and are simple in construction with an easy accessibility to all parts.

It must not be considered that this review covers all that has been done in the way of providing bogie or swiveling trucks for electric cars. Each manufacturer has many styles adapted to special services that differ to a greater or less extent from those here illustrated. These have merely been chosen as typical of the style of design followed by the several makers and without any attempt to specify the peculiar service for which each is designed. Nothing has been said about the tracks that are built for four-wheeled cars, as that opens up quite another department of truck construction.

Enough has been shown, however, to indicate the advances that have been made in the last ten years in the development of the rolling stock of electric railroads. At the beginning of the decade the cars were small and light, with bodies not more than sixteen feet long. There were no bogie trucks in use, and there was a great reluctance on the part of managers to agree to any increase in the weight of rolling stock. At present the use of the long car on bogie tracks is the prevailing practice on all heavy traffic roads, while the length and weight rivals that of the ordinary steam passenger cars of twenty-five years ago. Cars that weigh empty 35,000 lbs., as they stand on the tracks, and which are frequently loaded with a hundred passengers at once, are common. Speeds that rival those of the steam roads are not yet of every-day occurence, but twenty miles an hour is so frequent as not to attract attention. The work has assumed the proportions of serious railroading, and is beginning to call loudly for the same system of protection against accidents, and methods of construction that obtain on the best steam roads. How far these demands are complied with is but partially shown by the tracks here illustrated, in which such modifications have been introduced into the construction of the bogie truck, as to adapt it for the service which it has to perform under the new and rapidly advancing conditions of electric railroading.

SOME HANDY TOOLS AND SHOP HINTS FROM ABROAD

By Robert Grimshaw.

While in most respects the Germans are far behind the English, and still farther behind the Americans, in handiness of tools, and especially in those which are used for general manufacture and repair work, as distinguished from those for special manufacture of articles a hundred or thousand at a time—there are some things in which they are leading us.

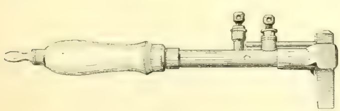


FIG. 1

AN ALCOHOL SOLDERING BIT.

The apparatus here pictured (Fig. 1) is a soldering bit arranged in connection with a reservoir of alcohol attached to the wall near the work being done, and in combination with an alcohol gas flame, it remains constantly at the desired temperature so long as needed. The alcohol flame issues from holes in the side of the tubular handle and heats the butt end of the hammer bit. A constant although slight supply of alcohol trickles down from the reservoir through the tubular handle, which has a wooden sleeve or "grip" to protect the workman's hand. A suitable stand permits the tool to be laid down while the flame is burning, or the latter may be turned down if desired. There is no wick needed and no compressed air used. It takes four minutes to heat a bit from 60° F. to a temperature for soldering. The alcohol consumption per ten hours runs from 0.75 to 1.25 quarts common wood alcohol. No explosions are known to have taken place.

Removal of the bit permits the flame to be used in brazing, in flame soldering or in autogenous soldering.

The price in Germany, with 5 feet of rubber tubing, a reservoir holding 1 qt., and a half pound copper bit, is somewhat less than $4.00, and the stand about 40 cents.

GERMAN BENZINE LAMPS.

The use of wood alcohol in Germany for domestic and manufacturing purposes has indirectly aided in the development of benzine as a heating agent; and the German plumbers' supply stores display a great variety of benzine lamps, not merely for kitchen and laboratory use, but for brazing, soldering, etc.

The lamp shown in Fig. 2 is intended to supply the demand for one which will give either a vertical or a horizontal flame at will.

The reservoir for benzine is spherical and weighted at the bottom. Being hung on horizontal trunnions it may be turned so as to give a horizontal or an inclined flame at will; but on being released, instantly assumes an upright

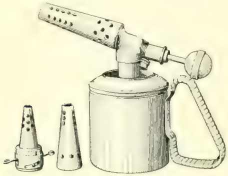


FIG. 2

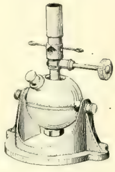


FIG. 3

position. The wick is said to outlast one hundred fillings with pure benzine. The maximum flame temperature reached, or claimed, is about the highest temperature in porcelain kilns, being that attained in the royal factory in Meissen, Saxony, which is about 3150° F.

Fig. 3 shows a brazing lamp made by the same firm for burning benzine without a wick. The screw regulation is effected by turning the spherical knob at the back of the tube. There are three separate nozzles supplied, according to the kind and size of flame desired; the smallest (No. 0) being for use in autogenous lead soldering and brazing gold; the largest for plumbers' and metal workers' use generally.

THE "CAM" WRENCH.

For once, the Germans seem to have got something simple and effective. The adjustable wrench (which would be a "monkey wrench" with us if it had a screw, or similar mechanism to effect adjustment, as originally invented by Mr. Thomas Moncky of Bordentown, N. J.), shown in the illustration (Fig. 4), has simply a fixed jaw and a sliding one, the latter running easily on a truly turned cylindrical body to which a handle is fitted. A stop prevents the slid-

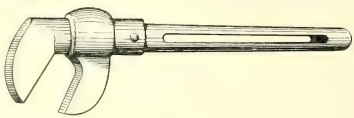


FIG. 4

ing jaw getting lost. To use it, the slider is simply brought up snug against the bolt-head or the nut to be turned, and the slight "cocking" of the jaw on the barrel is sufficient to prevent slipping. There is a photograph at present before me, of a No. 3 wrench (the British workman calls it an "adjustable spanner," by the way) with handle in horizontal position, holding on to a nut, while the handle bears a block of steel 20 x 10.8 x 10.8 inches, weighing 660 lbs. avoirdupois. This shows good stock and a good grip.

PIPE ATTACHMENT FOR VISE.

A rather good idea for a pipe attachment for an ordinary vise (Fig. 5) is made of two simple castings, one of which (A), is shaped to fit the back jaw of the vise, exactly as the copper cheek is, and the other (B) has V-shaped corrugations of different depths but all having the same height of crest. This piece (B) has a short pin (C) at the center of its

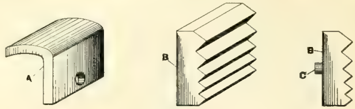


FIG. 5

back, and this fits snugly in a hole in the center of the flat face of A, so that the grooves may stand vertically, horizontally or diagonally. The pipe is laid in the proper groove and held between the block B and the front jaw of the vise, the pin C permitting it to be held at the angle most convenient for work.

TURNING THIN RINGS.

Where a great many thin rings have to be turned inside and out and on both narrow faces, it is desirable to have some special device which will enable them to be chucked and unchucked rapidly and accurately, and at the same time will obviate the tendency which otherwise may come up, to spring the ring into lobes.

The rig here shown (Fig. 6) has for its object the use of the ordinary three-jawed or four-jawed chuck (preferably the latter) and the avoidance of springing the ring into a three-leaved or four-leaved clover or (as the architect would call it,) a "trefoil" or a "quadrefoil."

It is intended to fit on the uppermost jaw-step J, being secured thereto by the set-screw T, which has a square end to fit the usual socket key. The frame A embraces this top step, its inner edge is a little convex or pointed, as better fitting various ring-diameters (particularly on the smaller sizes). The set-screw S has the same square end as T, and this should preferably be of the same size as the socket wrench used for the chuck itself. The ring R may be held in this chuck without being sprung either from the inside

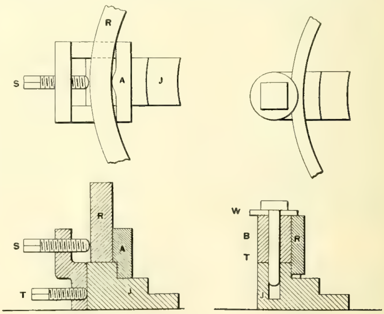


FIG. 6 FIG. 7

or outside. If it be desired to turn the ring with both circular surfaces concentric, this can be done; or if, as for split piston rings, it is wished that both be circular but not concentric with each other, this can be done either by setting one of the jaws further above, or by means of a "shim" or packing.

To turn both curved surfaces all the way along, of course the ring must be turned "other face in." As this must be done, anyhow, in order to turn the second face, it is no great matter.

To turn rings inside or out (not both) without re-chucking, the rig shown in Fig. 7 may come in handy. In this, the chuck-jaw step J is tapped for the clamp bolt B, which carries a washer W that bears on the flat face of the ring. A thimble T gives the ring a good side bearing against the bolt. Under the ring and between it and the next chuck-jaw step comes a bit of packing to give the lathe-tool clearance. This may be a simple copper wire ring, or other convenient thing.

(To be continued)

The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Proposed Irish Channel Tunnel

Engineering News, May 23, 1901, p. 372.

Extracts from a paper read some years ago by Mr. Barton before the Federated Institution of Mining Engineers, are given. For purposes of drainage it is necessary to have a fal to the shore ends of the tunnel, and this is effected by headings which convey the water to the sumps at the shore shafts, where pumping engines would be placed. The drainage headings would also perform an important part in the matter of ventilation. The bottom of the channel has been sampled in a rather extensive way by the Hydrographic Department of the Admiralty. They have found it to take chiefly ooze, shells, fine mud and sand.

The late Mr. W. Topley of H. M. Geological Survey, London, said that experience in subaqueous tunneling goes to show that the chief dangers of water lies in the approach-tunnels, rather than in the portion situated under the bed of the sea or river.

The late Sir John Hawkshaw, whose firm were engineers of the Severn tunnel, said, "A tunnel beneath the sea, if only deep enough, was just as likely to be dry as a tunnel beneath the land." Sir Douglas Fox, engineer of the Mersey tunnel, said, "When the tunnel was commenced apprehensions were very general as to the danger of the water coming in through fissures. As a fact only one fissure was encountered, and that was certainly drier than other parts of the work." Sir Benjamin Baker said, "A headway was driven under the Forth, a mile, and at Whitehaven one-half a mile under water; in both cases as that described by Sir Douglas Fox under the Mersey, they found less water under the sea than under the land portion of the work."

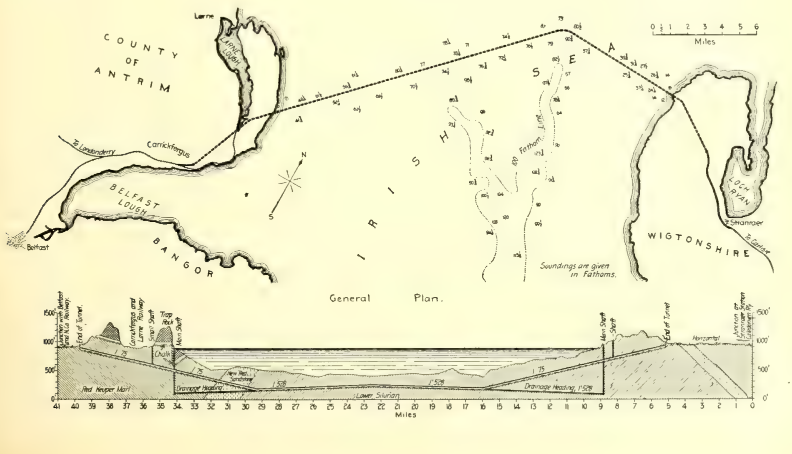
The estimates at this stage are preliminary, but for the route proposed £8,400,000 is set down; special contingent expenses being probable, Mr. Barton would state the cost as between £8,000,000 and £10,000,000.

In considering the probable time for completion, some information on other tunnels is given. The Mont Cenis, 8 miles long, average driven 2 1-2 yards per day. The cost was £224 per yard. St. Gotherd 9 1-4 miles long, 2 1-2 yards driven per day in 1872; 10 yards per day in 1880, complete in 7 1-2 years and cost £142 per yard. Arlberg 6 1-3 miles long begun in 1880, time to complete it 3 years, 7 yards per day increased to nearly 12, cost per yard £107; total cost £1,200,000.The Simplon tunnel between 12 and 13 miles long, an increase of speed over its predecessors is expected. The Irish Channel tunnel estimates include £125 per yard in Silurian rock and £102 in marls and sandstone; add to these the cost of pumping and ventilating machinery and the cost of shafts, etc., and the time would probably be from 10 to 12 years.

Progress of the Simplon Tunnel

Consular Reports, May 22, 1901. p. 4.

At both extremities of the tunnel, the installations have been completed, the permanent ventilation system has been placed at the southern end, but at the northern extremity the building which is in course of erection for that purpose is not finished. However, in case of failure of water power, the ventilation is



assured by special machinery for use in case of emergency. The progress of the work in the tunnel itself has been regular and has kept pace with the contract. The advance in Tunnel No. 1 in 1900 amounts to 11,155 feet which means for 360 days of work, an average of 30.9 feet per day, as against 11,339 feet or 31.4 feet per day in 1899. The expenditure for construction of the tunnel, including lines of access amounts in round numbers to $1,466,800 for first year and $3,474,000 for the second.

Ventilating the Elkhorn Tunnel—Norfolk & Western R'ly

Railroad Gazette, May 10, 1901, p. 310.

The full description of this important piece of work has been furnished by Mr. Charles S. Churchill, engineer, Maintenance of Way. The tunnel is through the Flat Top Mountain in West Virginia, which forms the divide between the waters flowing into the New River, on the east, and those flowing into the Ohio, by way of Elkhorn Creek and Big Sandy, on the West. There is an up-grade through the tunnel going east of 1.4 per cent. The tunnel is lined throughout with brick, and has a single track through it, though the Norfolk and Western is a double-track road. The method employed in the Pracchia tunnel in Italy having been explained by the engineering journals, formed the basis of the method adopted at the Elkhorn tunnel. Notes taken prior to ventilation showed that in Summer 17 to 55 minutes was required to give the air in the tunnel time to clear. The shortest time noted was 20 minutes, in the Winter. The method consists in flaring out the portal at the west end and running two walls parallel to the track, about where the original line of the tunnel stood. This made an enclosed triangular area on each side, and into this box air was forced from two fans. At the narrow end of the triangle an opening was left which formed a kind of nozzle. The machinery consisted of two fans, 14 feet in diameter, each operated by an engine of 75 horse-power; the number of revolutions per minute which delivers air at one ounce pressure at the outlet of the fan being 118, and the rated delivery at this speed being 168,558 cubic feet per minute per fan. Details of a number of most satisfactory tests which were made are given by the author. The idea was to blow the smoke of east-bound engines ahead of them, and the west bound, being on a descending grade, would practically give no trouble from smoke. A three-engine east-bound train passed through the tunnel in six minutes while the fans were running at 142 revolutions per minute. An observer on the tender of the first engine, cab windows being open, reported the tunnel entirely clear two-thirds of the way through, and no objectionable smoke anywhere. The enginemen reported the tunnel O. K. Another observer rode on the second engine, with windows open; he could see the smoke of his engine seven cars ahead of his engine, with no smoke behind. Another, on the rear engine, in the cab with windows open, found tunnel practically clear, and no smoke behind. An observer at the east portal reported that smoke came out of the tunnel two minutes ahead of the first engine.

New Bridge at Newcastle

The Times (London), Weekly Edition, May 10, 1901, p. 302.

A novel and interesting engineering feat was accomplished on the Tyne on Sunday, when the spans and roadway of the bridge connecting Newcastle and Gateshead, which had been built 4 1-2 feet to the eastward of the position they were ultimately to occupy, were moved over into place. The building of the bridge has been remarkable as an example of modern engineering practice. An old bridge existed, and the new bridge has been built on precisely the same site the old one occupied. The traffic has yet gone on uninterruptedly. The new piers were built round about the old ones, and the roadway and spans were erected a little above and 4 1-2 feet to one side of the old roadway and spans, a temporary footway meanwhile being provided for foot passengers. The old piers were then taken away and the new roadway was lowered to its proper level, and yesterday morning moved over into its permanent position. This was accomplished by means of hydraulic jacks. The total weight of the bridge was 1,600 tons, and the jacks were capable of exerting a pressure of 1,500 lbs. to the square inch. The bridge is built of steel and is of the American type, but the details are strictly in accordance with the best English practice. There are four spans, two of 252 feet, and each of the others 170 feet. The total length of the bridge and its approaches is 1,900 feet. Its total weight is 2,900 tons. The bridge is carried on cylinder foundations, each 8 feet in diameter and sunk to a depth of 50 feet below low water. There are four cylinders to each pier. The engineers of the bridge are Messrs. Sandeman and Moncrieffe, of Newcastle, and the builders are Sir William Arroll & Co., Glasgow.

Transition from a Rising to a Falling Gradient

Bulletin, International Railway Congress, April, 1901, p. 645.

Investigation of the best means of connecting rising and falling gradients.

CONCLUSIONS.

1. Except in certain exceptional cases, for instance, at the entrance of an important station, the connection of different gradients is not a matter of any difficulty.
2. On lines with gentle gradients it is sufficient to set out the curves by eye during maintenance.
3. When the gradients amount to and exceed 10 millimetres per metre (1 in 100), it is advisable to take them into consideration in setting out the formation level. The connecting curve may be either circular or parabolic, and there is no practical difference between these two curves. It is enough if the ends and the highest point of the curve are accurately determined, and they are then connected approximately by one continuous curve.
4. It does not appear to be any advantage on lines with steep gradients to have connecting curves of a radius exceeding 5,000 metres (250 chains); a radius of 2,000 metres (100 chains) is quite satisfactory at places where the speed does not exceed 50 kilometres (31.1 miles) per hour.
5. It is, however, strongly recommended to avoid having a sudden change of gradient at the commencement of a curve.

Preservation of Timber

Bulletin, International Railway Congress, April, 1901, p. 647.

Investigation of the various methods of preserving timber of all kinds employed for construction purposes and especially timber for railway sleepers (ties).

CONCLUSIONS.

1. It is advisable to continue the study of the most recent processes for the preservation of timber, with the object of determining, as far as the utilization of wood for railway sleepers is concerned, some method of preservation which would give the sleepers a life equal to the time necessary for growing a corresponding amount of new timber.
2. It is advisable to study the cause of any deterioration of wood in tropical climates and the means for preventing such deterioration, particularly in the case of railways, where such wood is used for sleepers.

Rail Joints

Bulletin, International Railway Congress, April, 1901, p. 625.

Improvements effected in the design of rail joints, especially on lines over which express trains and engines with heavy axle loads are run.

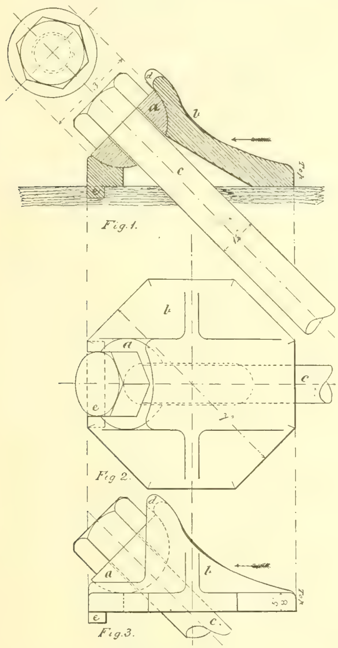
CONCLUSIONS.

"The Congress thinks it advisable that, while continuing experiments on the improvement of suspended joints, railway managements should undertake or continue experiments with all other classes of fishplate joints, particularly with the supported joint. It also thinks it advisable that experiments should be made with a view to reducing the number of the joints, particularly by welding the rails." These conclusions were adopted by the general meeting.

A Spherical Washer

Modern Machinery, May 1901, p. 167.

The spherical washer has been introduced with success in a great many cases, and is effective and economical especially in bridge building. The one illustrated was designed by Mr. T. P. Pemberton. There are only three pieces. The first, *a* is a cast iron hemisphere with hole cast in it for a 1 1-4 bolt or rod, *b* is a cast iron octagonal plate with concave pocket, and *c* is the screw bolt, placed at an angle of 45 degrees, but it is evident that the bolt can be placed at other angles. The lug *e*,



SPHERICAL WASHER.

is inserted in wood, brick or other material in order to keep the plate from slipping to the right, as shown in the illustration, and against the direction indicated by the arrow. The projecting hood or bonnet, *d*, is for the purpose of protecting the seat of the bolt head from the weather.

[If the octagonal plate *b* was made of malleable iron could not the hood *d*, by a blow or two of a hammer, be made to act as a very effective nut lock? The design has this advantage, it can be made "standard" for various sizes of bolts or rods, and is capable of use without reference to the angle at which the rod may be placed.—Eds. Railroad Digest.]

Steam and Electric Railway Crossings

Street Railway Journal, May 11, 1901, p. 574.

Builders of electric railways in Michigan are greatly opposed to the position taken by the Commissioner of Railroads regarding the crossing of electric and steam roads. Under the State laws no crossings of this nature can be made until approved by the Commissioner of Railroads, and the present Commissioner refuses to approve any crossings within the main lines of any railroad. It is claimed that owing to the large number of electric roads which demand grade crossings at all desirable points it would be impossible to obtain the high speed which is essential to first-class traffic. It is further claimed that the expense of a grade separation is but little, if any, more than the expense of a first-class interlocking plant, as needed at grade crossings, and its maintenance costs comparatively nothing compared to the cost of maintenance of an interlocker. It would eliminate all danger of collision between the cars of the two systems. The electric companies claim, on the other hand, that inasmuch as the established lines are permitted to maintain established grade crossings it is an injustice to the proposed lines to put them to such great expense, while allowing the older companies, who are better able to bear the additional cost, to continue their present practice. The Jackson and Suburban Traction Company, of Jackson, has been granted a writ of mandamus by the Supreme Court of the State requiring the Commissioner of Railroads to show cause why a recent order for a grade separation on Page Avenue, Jackson, should not be set aside. It is claimed by the company that the right to regulate and control its streets is vested in every city by the State, and a law which attempts to take this power away from the city and vest it in a State officer without due process of law is unconstitutional and void. The result of this case will be awaited with interest by the electric and steam railroad men of Michigan and elsewhere.

Influence of Brakes on the Life of a Rail

Railroad Gazette, May 10, 1901, p. 313.

The Gazette quotes briefly from Prof. J. O. Arnold's paper read at a meeting of the Sheffield Society of Engineers. "A rail tested after 18 years' service under low speeds and no braking, neither the tensile nor the drop test indicated any fatigue in samples taken from the end and middle of the rail. Another rail, subjected to high speeds, but no braking, also throughout showed no signs of deterioration both in the head and foot. The third rail tested, over which high speeds and severe braking had been the rule, showed at the end near the fish-plate bolt holes, remarkable deterioration both in the head and foot. Under the drop test the steel was hopelessly brittle, and in the tensile test made with metal from the head, the elongation was only one per cent. in 2 inches, while that from the foot of the rail exhibited only very slight signs of mechanical deterioration. The tensile tests from both head and foot gave an elongation of about 18 per cent., and this portion of the rail also stood an excellent drop test. There seems little doubt that a steel rail may, under certain conditions, run out a life of 20 years and be dismissed with an excellent character; whilst had the same rail been subjected to severe braking it might have badly deteriorated. The question for steel rail metallurgists is: Is there any chemical composition which, combined with practical re-heating and rolling conditions, will make a rail incapable of deteriorating in any circumstances in which it may be placed during a period of 20 years?"

Points and Crossings

Bulletin, International Railway Congress, April, 1901, p. 627.

General rules for the construction of switches, cross-overs and diamond crossings on lines where these parts of the permanent way are run over without reduction of speed, especially by trains traveling at express speed and engines with heavy axle loads.

CONCLUSIONS.

All the railways having extended systems on which high speed trains run now possess points and crossings over which trains can run at any speed. These appliances are very much the same with the different railways. In no case is the passage of points or crossings effected without a certain amount of shock being produced. These shocks are due to the following two factors: 1. The wheels of the vehicles must be guided into a definite position in order to run over these appliances. 2. There is a gap in the continuity of the running surface of

the rails at the frog. The amount of shock is hardly appreciable with new and well constructed appliances, but becomes considerable on worn or badly maintained appliances. Spring crossings or other appliances which do away with the gap at the frog are not used by the European railways to whom we have applied for information. Such crossings are used in the United States, but the data available is not sufficient to enable us either to criticize or recommend them. Interesting investigations could be made on the subject, and there is no doubt that it would be a considerable step in advance if such a crossing were worked out, which would be solid and strong, and satisfy all the requirements of modern traffic. On the whole, although the different appliances used are not absolutely theoretically perfect, they are practically perfect to such an extent that, although it may still be possible to improve minor details, they are absolutely satisfactory, and allow the heaviest and quickest trains to run over them with perfect safety." These conclusions were adopted by the general meeting.

Creeping of Rails

Bulletin, International Railway Congress, April, 1901, p. 652.

What relation exists between the disturbing action of locomotives and the creeping of rails?

CONCLUSIONS.

Creeping of rails is now effectively prevented by suitable construction and maintenance of the permanent way, and it does not involve serious difficulties. From the careful investigations which have been made on creeping, it has been found that the forces exerted by the locomotive on the track are not quite symmetrical, and that the advance of one rail over the other may in part be explained by some forces due to the locomotive. This phenomenon, though unaccompanied by serious consequences, nevertheless presents features of theoretic interest for engineers who are engaged in the construction of locomotives.

Nature of Metal for Rails

Bulletin, International Railway Congress, April, 1901, p. 622.

Hard or soft steel. Relation between the hardness of rails and that of tires. Means to obtain the homogeneity of the metals in heavy sections. The most suitable length of rails for general adoption. Observations made since the Milan session (1887) on the wear and deterioration of steel rails, especially those of heavy sections. Wear and oxidation of the rails in long tunnels and along the border of the sea or inland saline districts. Technical conditions of manufacture. Means of preventing the formation of blow holes, retention of slags and porosity of the ingots. Means of detecting the existence of internal flaws during the manufacture and inspection of the rails.

CONCLUSIONS.

"It does not seem advisable to lay down definitely what kind of metal is the best to use for the manufacture of rails. It is advisable to continue the investigations already made with this object, laying down accurate definitions for the terms 'hard' and 'soft' steel, and adopting uniform experimental units." These conclusions were adopted by the general meeting of the Congress.

Track Maintenance, Heavy Traffic and Continuous Speed

Bulletin, International Railway Congress, April, 1901, p. 629.

"As regards *current maintenance,* the Congress notes that a large number of managements have given up partial maintenance in favor of general revision, and that both systems can be carried out without slackening speed of trains. In order to reduce these slowdowns to a minimum, especially in the case of fast trains, pains should be taken: 1. To pay attention to the proper drainage of the roadbed, especially in damp places. 2. To provide ballast of good quality and in sufficient quantity for the sleepers to rest upon. 3. To select carefully the permanent way materials so as to make the track solid, durable and homogeneous. As regards *renewal* of the permanent way, the Congress, with a view to reducing the number of slowdowns rendered obligatory, believes it is often advantageous to carry out, when occasion arises, the renewal of the constituent parts of the permanent way—rails, sleepers and ballast—simultaneously rather than successively. 2. Draws attention to the method of renewal by temporarily adopting single-line working, which makes it possible to treble the speed at which the work can be executed, provided it be compatible with local conditions. 3. Recommends large gangs where renewals are to be carried out on tracks in use. 4. Suggests that not only the beginning, but also the termination of a slow speed section should be clearly marked for engine drivers by visible signals."

Locomotive Equipment, Appliances and Related Matters

The American Locomotive Company

Toronto World (Toronto), May 18, 1901, p. 1.

Samuel R. Callaway, for the last two years president of the New York Central and Hudson River Railroad Company, tendered his resignation to accept the presidency of the American Locomotive Company, a $50,000,000 corporation recently organized. Mr. Callaway made it clear that there was no difference of opinion between himself and the Vanderbilts. In fact, it is understood, that the Vanderbilts will be prominent factors in the new locomotive company. It is declared that the American Locomotive Company will control fully two-thirds of the output of locomotives in the States. These concerns are included in the combine: Brooks Locomotive Works, Dunkirk, N. Y.; Cooke Locomotive and Machine Works, Paterson, N. J.; Manchester Locomotive Works, Manchester, N. H.; Pittsburg Locomotive and Car Works, Pittsburg; Schenectady Locomotive Works, Schenectady; Richmond Locomotive Works, Richmond, Va., and the Rhode Island Locomotive Works, of Providence, R. I. The last named concern is in control of the International Power Company, which will probably play an important role in the affairs of the consolidated company.

Mr. S. R. Callaway is a Canadian, and not so many years ago was at the first rung of the ladder of success in Toronto. From humble circumstances to the head of the greatest railway organization on earth, he has worked his way by virtue of his unaided ability. His joining the Locomotive Trust must be another step up, or he would not take it.

Coal Economy

Proceedings, South-Western Railway Club, April, 1901, p. 39.

The transportation department as a rule looks on with evident satisfaction at the unnecessary waste of coal, owing to both modern and antiquated engines being overloaded and overscheduled. Engines are frequently shamefully abused for ten to twenty-five miles to make an important meeting point; a ton of coal wasted and flues leaking on arrival are the results, and then, possibly, one-quarter to three-quarters of an hour on a siding waiting, during which time enough coal is consumed in the fire-box to haul the train five or six miles, when, possibly, the delay was partially due to the opposing train being handled in the same manner. There are many men running engines who are more eager to have a train dispatcher or trainmaster pat them on the back for a "fine run," when, in reality, it is a piece of daring recklessness or shameful abuse of a piece of machinery that in the end may stand charged with the stereotyped crime "engine failure," when possibly no builder could construct a machine that would stand such abuse.

[It is not an uncommon thing to hear an engineman say something like this: "On the new time table it's cruel pounding all the way from Baffler to Ardley to meet X, but from there on you can't kill the time."—EDS. RAILROAD DIGEST.]

Wide Firebox Passenger 4-4-0 Engines

American Engineer and Railroad Journal, May, 1901, p. 144.

The new engines built by the Schenectady Locomotive Works for the Delaware, Lackawanna and Western Railroad have larger grates than those built last year for the same road. They are the results of careful study by Mr. Lloyd on the action of anthracite of the smaller sizes. It has been found possible to secure important savings in culm burning. These grates, with an area of 87.67 sq. feet, are giving excellent results, showing that they are correct for the conditions. The engines are designed with reference to the use of various mixtures of fine anthracites, and this is suggestive to those who are taking the first steps to adopt wide grates to bituminous coal burning. The engines are equipped with Westinghouse-American combined brakes, Leach sand-feeding apparatus, and Gollmer bell ringer.

Vauclain Compound for Australia

Railroad Gazette, May 17, p. 335.

The Baldwin Locomotive Works has recently built twenty compound freight locomotives for the Government railways of West Australia. The gauge of the line is 3 feet 6 inches. The cylinders are 12 and 20 inches, and the diameter of the driving wheels is 54 inches. The weight on drivers is 71,020 lbs., the total weight is 103,220 lbs. The barrel of the boiler is 56 inches in diameter and is made of sheets 9-16th inches thick. There are 259 copper tubes in the boiler. The fire-box has 121 square feet of heating surface, and the tubes 1,478 square feet, making a total of 1,599 square feet for a grate area of 20.5 square feet. The working pressure is 200 lbs. Piston valves are used.

[*The Railroad Gazette* calls these engines "six-coupled freight locomotives." The wheel arrangement shows them to be of the type which we called the "St. Paul," in the diagram published in the April number. The wheel arrangement is 4-6-2. —Eds. Railroad Digest.]

Inspection on the Manhattan "L"

Railway Age, May 17, 1901, p. 534.

The four lines of elevated road, which in New York city, run up 2nd, 3rd, 6th and 9th Avenues are estimated to transport, at the present time, between 600,000 and 700,000 passengers every day. In the 23 years of their operation not a passenger has been killed. It is the motto of the officers to take absolutely no risks. Some one once congratulated the manager of Noble's nitroglycerine factory on their remarkable luck in never having had an explosion. "We have not been lucky at all," replied the manager, "but we have been careful." It is quite in order to say, of the elevated road, as of many other matters, "Eternal vigilance is the price of safety."

The inspection of the locomotives is practically constant. The inspectors are divided into three classes known as terminal, yard, and shop men. The terminal inspectors examine the engine at the end of each trip over the road, and if the slightest thing is found to be amiss, the engine is not sent back with a train until it has been made right. When the engine is laid up after the day's work it is thoroughly inspected by the hostler and again by the yard inspector. This external inspection does not tell the whole story. The life of axles is limited to 250,000 miles, after which they are removed regardless of their apparent condition. The same rule applies to crank-pins, only their life is limited to 125,000 miles. In addition to this, the crank-pins are subjected to a special inspection every 30 days at which time drastic measures are employed. A sharp blow delivered by a 12-pound sledge-hammer, is struck on each quarter of the pin. This brings any incipient crack to view, or it may break the pin. Breakage on the road is thus guarded against. It may be mentioned that the crossheads are cast steel of the Laird type, and the piston rod is held to it by a nut, no key being used. The ash pan and netting of every engine are inspected daily, and the dropping of ashes or the throwing of sparks is unknown. The road is very fortunate in the water used, which makes little or no trouble with the boilers. Here the work of inspection may be described as somewhat less rigid than on many other steam roads. Tubes last almost indefinitely and a broken staybolt is rarely heard of. The reason for the first is the purity of the water and the second is probably due to the smallness of the firebox. The boilers are washed out every 14 days, but the staybolts are inspected only once in 18 months. It is years since a broken staybolt has been found. The working pressure is 145 lbs., and if the boiler shows so much as a suspicion of a loss of strength the pressure is at once lowered. The engines are worked to their utmost capacity, and on the express runs, during the rush hours, are driven at speeds above 45 miles an hour with five densely packed coaches behind them. This, with driving wheels but 42 inches in diameter means very high piston speed. Yet, in spite of all this, a breakdown on the road is unknown, and men travel to and fro daily for years without experiencing the slightest delay due to any trouble with the locomotive.

The car inspection is equally thorough. Trucks and brake gear are carefully examined, and an extra day's pay is given to the man who discovers a loose wheel. In the matter of axles, they run until the wear of the journal indicates that a new axle is necessary. As the car platform gates are an essential feature in the safe operation of the elevated roads, special gate inspectors are employed. These men examine every gate on every car on the entire system every day. The result is that a defective gate upon a moving car is never seen.

Finally, there is the cleaning of the cars, which is on a par with the rest of the work. Each car is cleaned, and the aisle matting turned after every trip, and twice daily each is disinfected with thymol. After the day's work is done a thorough cleaning and inspection is made.

[As a matter of safety an extra guard rides on the rear platform of all express trains. The inspection of locomotives and cars on the Manhattan Railroad comes as near attaining perfection in what we may call the successful "anticipation of failure," as anything of which we have ever heard. Every mechanical man knows what the absence of a cross-head key means. It is also probable that the engineers and firemen contribute their quota in the matter of pointing out such defects as become apparent in service. If, as we believe, the inspection in the other departments, which include track, signals and structures, equals that of the engines and cars, it is very evident why the New York "L" roads have such a remarkable record.—Eds. Railroad Digest.]

Throttling

Trade Journals' Review (Manchester, Eng.), May 15, 1901, p. 106.

A correspondent of an American contemporary says that it is usually better to run with the throttle wide open, but at times it is not so economical as running with the steam partly throttled. If an engine uses more water when hooked up, say to a cut-off at 6 inches and the throttle wide open, than she could do when working at, say, 8 inches, with the steam partly throttled, it is not good economy to run at the shorter cut-off. Steam engineers used to insist that as short as possible a cut-off and an open throttle was the most economical way to run an engine. Experienced and observing engineers doubted this, and their opinion was lately corroborated by Mr. Charles T. Porter, an accomplished engineer. He made a series of careful tests, which convinced him that under certain conditions more steam was used when a throttle was run wide open than when the steam was partly throttled.

The Thuile Locomotive

The Engineer (London), April 26, 1901, p. 431.

Mr. Chas. Rous-Marten describes this engine as one which Americans would consider belongs to the "freak" type. The engine runs foot plate first, but the foot plate is in front of the smoke box and has practically a cab built over it. The leading driving wheel is placed where American practice usually locates the cylinders, but in this engine the cylinders are placed further forward and are under the forward cab. The fire-box is carried on a six-whel truck at the back. The front of the tender is carried by a four-wheel truck, and the back by a six-

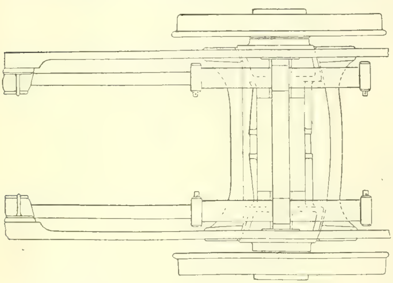
wheel truck. Mr. Rous-Marten points out that engine and tender are carried on twenty-four wheels, of which only four are drivers. The weight of the engine and tender in working order is very nearly 140 tons. Of this huge total, the amount available for adhesion is less than 32 tons. The cylinders are 20 x 30 inches (nearest English equivalent for metric measure), and the driving wheels are 8 feet, 2½ inches in diameter. The tractive force in pounds for every pound of effective steam pressure on the pistons is shown to be no more than English locomotive superintendents get with engines 19 x 26 cylinders, with 7-foot coupled wheels.

The front cab is very spacious and convenient, well lighted, and has a wind cutter or prow-shaped front; it is in communication with the back cab by means of speaking tubes and bell signals. It is designed to haul "international" express trains weighing 180 tons at a speed of 75 miles per hour, and was built by Schneider et Cie.

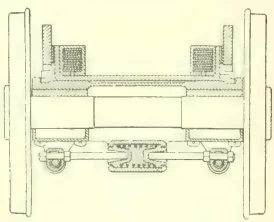
The Player Radial Truck

Railway Master Mechanic, May, 1901, p. 133.

It has hitherto been customary in the design of four-coupled engines of the wide fire-box Atlantic type to use a pair of trailing wheels, with journals in rigid pedestals, forged on to the main frame, thus making the total rigid wheel base of a locomotive the distance from the center of the forward driving axle to the center of the trailing or carrying axle. This distance on the majority of roads is limited to between 14 feet and 16



feet, and where large driving wheels are employed, necessarily makes the distance from the center of the main axle to the center of the carrying axle uncomfortably short, thereby imposing a superfluity of weight upon the trailing axle and leaving an excessive overhang therefrom to the rear end of the engine, causing the rear end to sway considerably, especially in passing through curves, and almost invariably causing



an overheating of the journals of the carrying axles. This construction, moreover, while imposing an unnecessary and harmful weight upon the trailing axle, at the same time reduces the weight upon the driving wheels, where such weight is required.

In order to overcome the objectionable features of this construction the Brooks Locomotive Works has designed and patented an improved form of radial axle for use in this connection. The introduction of this radial axle for supporting the rear end of locomotives of the above described type enables the location of the carrying wheel to be at the extreme rear end of the fire-box, considerably reducing the weight thereon and affording a greater amount of adhesive weight upon the driving wheels. This axle, at the rear end of the fire-box, also permits the use of a suitable ashpan arrangement, and otherwise materially improves and facilitates the construction of this type of locomotive. An additional advantage is secured by the use of a radial axle in reducing the rigid wheel base of the locomotive to that of the driving wheels, thereby reducing flange wear on the drivers and leading truck to a minimum and at the same time permitting the engine to pass the sharpest curve with the greatest ease, and also preventing heating of journals from the excessive hub friction occasioned by the use of a long rigid wheel base. We do not know of a single instance in the application of radial axles abroad where these have been equalized to the adjacent wheels, and consequently a very hard riding engine is produced. In the present improved design the radial motion can be made any amount that is desired. The vertical movement of the axle is made considerably more than that of the driving boxes, in order to provide a perfectly smooth riding engine over even the roughest track. In order to control the lateral movements of the axle-box frame in passing curves and return it to and maintain it in its normal central position on tangents, a center spring is provided, enclosed in a spring box fixed to the lower sides of the vertical connecting plates of the axle box, with its ends abutting against followers, which in turn abut against shoulders on the ends of of the spring box. Mr. John Player, mechanical engineer of the Brooks Locomotive Works, designed the truck.

The Power of Locomotives

Railway and Locomotive Engineering, May, 1901, p. 203.

Locomotive Engineering says that since tonnage rating of engines has come into vogue it is constantly asked how to calculate the power of locomotives. The following rules are given:

To figure the tractive power of a locomotive, say of dimensions: Cylinders, 20 x 26 inches; driving wheels, diameter, 66 inches; boiler pressure 180 pounds per square inch, square the diameter of one cylinder in inches, multiply product by length of stroke in inches and divide product by diameter of driving wheels in inches. That will give a quotient, which, multiplied by the mean effective pressure in the cylinders, gives the tractive force in pounds, from which about 12 per cent. should be deducted for internal friction. A rule established by the Railway Master Mechanics' Association makes 85 per cent. of the boiler pressure the initial cylinder pressure.

Now employ the Master Mechanics' rule for steam pressure in cylinders: 20×20 (diameter of cylinders) $= 400 \times 26$ (stroke of piston) $= 10{,}400 \div 66$ (diameter of drivers) $= 157.5$ pounds per pound mean effective pressure in cylinder. 180 (boiler pressure) $\times .85 = 153$ mean cylinder pressure, according to Master Mechanics' rule. 157.5 pounds per pound mean effective pressure in cylinder multiplied by 153 mean cylinder pressure equals 24,097.5 tractive power in pounds.

The train resistance on a good level track is about 6 pounds per ton at 20 miles an hour, and about 12 pounds at 40 miles an hour. The resistance for curves is about .5 pound per ton for each degree of curvature. The resistance for grades is found by multiplying the ascent of grade in feet per mile and dividing the product by the number of feet in a mile. The quotient multiplied by the total weight of train, including that of engine and tender, will give the total resistance due to gravity. Suppose we have a train weighing 800 pounds and a grade of 50 feet to the mile. We take one ton in pounds for the basis of the calculation, thus: $2{,}000 \times 50 = 100{,}000 \div 5{,}280 = 19$, the pounds per ton due to gravity. To pull this train up the grade named at 20 miles per hour would require an engine to develop about 20,000 pounds tractive force. The engine we have been figuring on would not be able to pull the train at the speed named because the mean cylinder pressure would be reduced at least to 110 pounds, owing to the increased piston

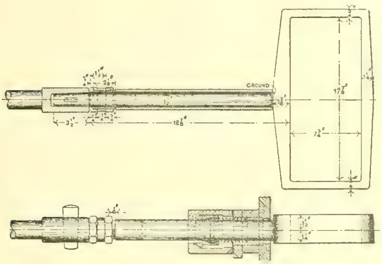
speed. Through data collected from a variety of indicator diagrams we think the engine could haul the train up the grade at about 8 miles an hour.

The report of an important committee of the Railway Master Mechanics' Association intimated that a well-designed passenger engine must have weight on the driving wheels equal to four times the turning effort transmitted from the cylinders, 4.25 for freight and 4.5 for switching engines.

Steel Sleeve for Valve Stems

Railway Gazette, May 10, 1901, p. 316.

On the Delaware and Hudson a neat device has been applied to the valve stems that are worn. The accompanying illustration affords a good idea as to the construction of the hardened steel sleeve as applied. The sleeve is put on over the stem and adjusted against a ground joint at the yoke by the nuts at the other end, which are merely backed off and tightened against



the rod connection. The construction is simple, but it must vary with the engine to which it is applied. The object of this device is to afford protection against wear, with a possibility of renewal when wear has occurred. The advantages are that the working diameter of the valve stem can be kept constant, also the wear on the hardened bushing is very slow, and the sleeve can be easily replaced. Those who have been bothered with escaping steam on account of a worn valve stem will be able to appreciate this device.

Shall We Split up Our Locomotives?

Literary Digest, May 18, 1901, p. 606.

The Literary Digest draws the material for this article from one of its contemporaries, devoted to the interests of science. It says our present locomotives carry boiler and machinery on one set of wheels, and, since the wheels have about all they can carry, it may be necessary in case of further increase in size to separate the machinery from the boiler and carry them on different structures, practically moving the present machinery into the tender. The plan proposed is to remove the engines and driving wheels to the tender, replacing the present locomotive frame by a low frame or platform, designed simply for carrying a boiler of the full diameter allowable by the present loading gauge. By this separation of engine and boiler it would be quite practicable to produce an express locomotive from two and one-half to three times the capacity of the most powerful express locomotive existing to-day. The boiler platform could be carried on two low six-wheel trucks, and by utilizing its full 10 feet of width to carry a water-tube boiler of the Yarrow, or some other first-class torpedo-boat type, and installing the necessary apparatus for forced draught it would be possible to provide three times as much heating surface as is found in the boilers of our largest express locomotives. As to the utilization of this great steam capacity, the tender might contain two independent sets of engines, arranged on the Atlantic type system, with the cylinders carried over four-wheel trucks at either end and two independent sets of four-coupled driving wheels between them. A water-tube boiler, built up to the limits of the platform on which it was carried, would provide an ample supply of steam at 225 lbs. pressure for two sets of the largest-sized engines that the adhesive weight of the tender would allow. If the steam tender was provided with four 22 x 28-inch cylinders and the maximum load was 110,000 lbs., the total draw-bar pull would be about 60,000 lbs., or sufficient to haul a train of fifteen Pullman cars over a road of normal gradients and curvature at an average speed of from 60 to 65 miles per hour.

[The first question a motive power man would ask is if boiler and engines are to be carried upon separate vehicles; what kind of a flexible joint is to be provided in carrying the dry pipe from boiler to steam chests. If boiler and cylinders are all upon the same framing, then the plan is in a way a modification of the existing Forney type. In either case the weight on the drivers would be a variable quantity, and a graduating traction increaser would be in order to compensate for the decreasing weight of the (presumably) forward vehicle, or forward end of the machine, as the water was slowly drawn off and the coal burned.—Eds. Railroad Digest.]

The Security of Locomotive Fireboxes

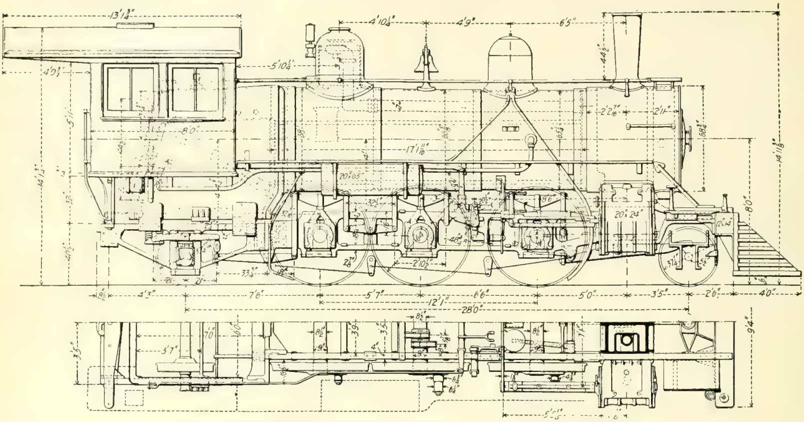
Engineering (London), April 26, 1901, p. 539.

A correspondent writes to *Engineering*, saying that as the ordinary working stresses in large fireboxes under high steam pressure are so nearly equal to the elastic strength of the materials employed, it is of great importance to arrange the details of construction with a view to the avoidance of secondary strains. The necessity of allowing free expansion is now generally recognized; much improvement in this respect has resulted from the use of the flexible stays first introduced on the Great Eastern Railway; the same end would be attained with solid stays if the diameter were reduced and the length increased, because the stress due to a certain relative movement of the ends is found to vary inversely as the third power of the length, and directly as the diameter. Longitudinal roof-bars are not fitted to large boxes in Continental and American practice; it is scarcely possible in the space available to make them sufficiently strong to carry the load without intermediate support, which is accordingly afforded by means of sling stays. The expansion of the hot copper box raises the sling pins from their bearings until they are brought down again by the pressure, causing deflection of the girders. As the gross pressure on the crown sheet of an 8-foot box amounts to about 340 tons, it is apparent that the stresses will be considerable. The total vertical expansion will be greater with deep than with shallow boxes, and the girders of the former will therefore droop more than those of the latter and be more highly stressed in consequence before they receive support from the slings. The difference in longitudinal expansion between the upper crown-plate, which is exposed to the full action of the fire, and the steel girders immersed in comparatively cool water will be considerable; the resulting fatigue of the material is manifested by the occurrence of cracked roof-plates. The arrangement of the flanges of the end plates has an important bearing upon the length of service of the box; the stays next to the corners are peculiarly liable to fracture, and cracks are developed along the lines of the flanges. The economy due to the use of large units of power will necessitate the employment of still larger fire-boxes on British railways; their security is a matter of extreme importance, and it is possible that a radical alteration of practice in this particular might be found to afford greater safety at less cost.

Boiler Explosions

A CORRECTION

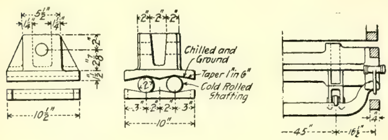
Two articles which appeared on page 183 of the May Digest, referring to a boiler explosion on the Lancashire and Yorkshire Railway, were both, by a typographical error, credited to *Engineering*. The first of the two—"The Knottingly Boiler Explosion"—is a resume from *The Engineer*, London.



BALDWIN ENGINE FOR THE HANNIBAL & ST. JOSEPH RAILROAD

American Engineer and Railroad Journal, May 1901, p. 135.

The recent construction of 30 engines for the use of the Hannibal and St. Joseph Railroad by the Baldwin Locomotive Works shows an excellent example of intelligent caution in designing. Before placing a large order for new engines, with several novel features, this road had a small number built, and, after running them a year, embodied the experience thus gained in the present order. The general arrangement, as well as the wide fire-box, has rendered a satisfactory service. Six of the new engines are Vauclain compounds, and the rest are simple



engines, with piston valves. The new design has 20 by 24 inch cylinders, and the weight has been increased about 12 tons. In general, the details of the frame arrangement, the equalization and the form of the trailing trucks are the same as before, but instead of placing the trailing equalizers under the truck boxes they now rest on top of them, with a saddle and side-motion rollers between. The frame cross-ties and the supplemental rear portions of the frames are substantially as before, to provide for outside journals for the trailing axle. The driving wheels are of the same diameter as before—64 inches—and the axles are enlarged at the wheel fits.

Why Take Down Main Rod?

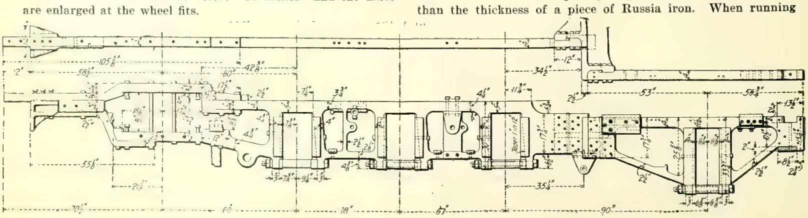
Railway and Locomotive Engineering, May, 1901, p. 198.

Mr. P. H. Stack, traveling engineer on the Union Pacific Railway, writes *Locomotive Engineering* on this subject, he says:

Ever since the locomotive has been used on railways the practice of enginemen has been to take down the main rod for the following accidents to machinery: Front cylinder head broken, broken rocker arm, broken valve rod inside or outside of steam chest, broken valve yoke, broken intermediate rod, broken link, broken link pin, broken eccentric blades, one or both blades or one or both eccentric straps or cams.

Since coming to the Union Pacific Railway I have demonstrated that it was absolutely safe to leave the main rod up, and have so instructed enginemen for the past twelve years. It saves labor on the road and in the shop, and one can run the engine at any speed without danger of doing damage to rails.

For the above mentioned accidents to an engine's machinery all that is necessary to do is to take down broken parts and if engine is on center on good side, push the valve on disabled side, either forward or back, until steam port is wide open, then open throttle enough to move engine until the good side is on the upper back eighth and stop her. Now move valve on disabled side until a very little steam is seen escaping from front cylinder cock, clamp the valve rod, and take out the front cylinder cock valve, open feed on lubricator on disabled side, so as to feed a little faster than the feed on working side, and engine is ready to move at any speed. With front cylinder head broken, push the valve ahead and open back steam port, take out back cylinder cock valve, leaving front cylinder cock valve in and closed. Opening of port need not be any more than the thickness of a piece of Russia iron. When running



shut off, oil may be admitted to cylinder through oil pipe at lubricator or through air inlet valves on steam chest.

A nice thing about leaving the main rod up is, if the engine should stop on the center on working side, all that is necessary to do is to take clamp off valve rod on disabled side, move valve rod to uncover steam port; the engine can then be moved to a position she will start in.

A clamp that will give the proper amount of port opening should be on each engine, as it is much handier than using pieces of wood instead of a clamp to fasten the valve.

The writer then describes in detail what is necessary to be done under similar circumstances with a Vauclain and a two-cylinder compound.

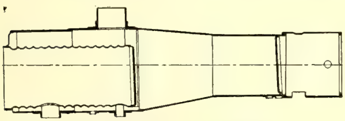
It will be necessary, he says, to feed cylinder oil to cylinders of compounds a little faster than to simple engines; this is owing to larger area of cylinders.

Another nice thing for enginemen to know is the quickest way to relieve a cramped reach-rod caused by a broken driving spring when lever is notched up. Take pin out of front end of reach rod; this allows links to drop down, then run driving wheel up on wedge and relieve cramped rod. Before taking pin out links should be held up and allowed to drop easily.

Vanderbilt Locomotive Boiler

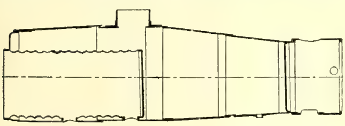
Railroad Gazette, May 10, 1901, p. 316.

The first engine with Vanderbilt boiler was a 10-wheel, No. 947, on the New York Central and Hudson River Railroad, built at the West Albany shops. This was in August, 1899. There are now eleven locomotives with this boiler and four under con-



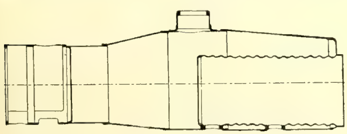
The Original Vanderbilt Boiler.

struction; they are distributed as follows, in addition to the first 5 moguls on the New York Central and Hudson River Railroad. Two consolidation on the Baltimore and Ohio. Two consolidation on the Union Pacific. One 10-wheel fast freight on the Illinois Central. The last mentioned is now to be seen at the Pan-American Exhibition. The engines under construction



Vanderbilt-Schenectady Mogul Boiler.

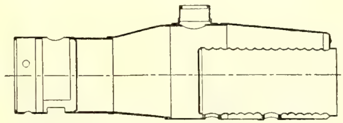
are two 10-wheel, for the Missouri Pacific; one consolidation, for the B. R. & P., and one consolidation for the Chicago Great Western. We are now informed that the Vanderbilt boiler has aroused interest in Germany, and that the German Government has asked for a consular report upon the matter.



Vanderbilt-Baldwin U P. Consolidation Boiler.

The table which follows gives the differences between a standard mogul on the New York Central and Hudson River Railroad and the Vanderbilt engines on the same road:

Dimensions and Weights.	Stand. Mogul, No. 1753.	Vanderbilt, No. 1766.
Diam. of cylinders, in inches........	20.	20.
Stroke of cylinders, in inches........	28.	28.
Weight on truck, lbs................	20,700	20,200
Weight on No. 1 drivers, lbs........	45,000	42,300
Weight on No. 2 drivers, lbs........	47,000	54,200
Weight on No. 3 drivers, lbs........	43,500	50,800
Total weights, in lbs...............	156,200	167,500
Largest diameter of boiler, inches....	73½	88
Smallest diameter of boiler, inches....	66	67¼
Number of tubes	366	517
Diameter of tubes, inches	2	1¾
Length of tubes, inches..............	146½	135
Tube heating surface, square feet...	2,323.6	2,585.0
Fire-box heating surface, square feet..	185.6	135.0
Total heating surface, square feet...	2,509.2	2,720.0
Grate area, square feet............	30.3	33.0
Steam pressure carried..............	185.0	190.0
Diameter of exhaust nozzle, inches..	5¼	5¼



Vanderbilt-Baldwin B. & O. Consolidation Boiler.

[The absence of mud-ring corners, of stays, and there being very few rivets in the neighborhood of the ash pan, must reduce the tendency to leak, which is sometimes developed about those regions and which in winter give trouble. The space below the grates within the cylindrical fire-box forms what may be termed a temporary ash pan. There being no fire-box legs, the regular ash pan is, other things being equal, probably at maximum height from the rail, which is also an advantage in winter, especially on roads which have every year a hard fight with snow.—Eds. Railroad Digest.]

Momentum Theory of Boiler Explosions

American Engineer and Railroad Journal, May, 1901, p. 153.

A very pertinent suggestion was recently offered editorially in *The Engineer* concerning the momentum of explosion of heated water in which an enormous amount of energy is stored. In a closed vessel the explosive energy of highly heated water is held in check by the pressure resulting from confinement in the boiler. The argument is this: Given a tube held on end, one-half filled with water, at a temperature of 358 degrees Fahr., the other half being filled with steam of the same temperature at a pressure of 150 pounds. If a jet of cold water be injected into the space above the water, the steam will condense instantly, and, beyond question, the moment the pressure is reduced a portion of the hot water will explode or flash into steam. "The received idea is that there would thus be an instantaneous rise of pressure, which would effectively prevent the further conversion of water into steam. In a word, the explosion would be stopped half way. Is this a certainty? We think not. It is quite conceivable that the momentum of the conversion of heat energy into mechanical energy would continue the operation with the result that the cylindrical vessel would be burst."

Water-Tube Boiler Explosion

Science and Industry, May, 1901, p. 189.

A water-tube boiler in the power house of the Los Angeles Pacific Ry. Co., situated at Sherman, Cal., exploded recently. The violence and disastrous results of the explosion were in every way similar to that of any ordinary shell boiler. An investigation disclosed the fact that petroleum was used as fuel in the plant, and it appears that through an oversight a valve which permitted petroleum to flow into the heater

and thence into the boiler was left open. One of the engineers discovered the presence of a large quantity of petroleum in the boiler eleven hours before the explosion occurrd. After consulting with the fireman, the electrician and the machine-shop foreman were called over and made acquainted with the serious state of affairs. The engineer advised that the boiler be shut down, and cleaned out. The foreman, however, insisted on running; with the now known result. As a consequence, the inner surfaces of the tubes and the drums which were covered with petroleum, became red hot, and caused the rupture of some weakened portion of the boiler, this allowed the petroleum to flow into the furnace, where it was ignited and finally produced the explosion. The investigation clearly proved that the explosion was in no way due to design, construction, or type of boiler, and that the makers were entirely blameless. The claim of immunity from disastrous explosions, usually made, for the water-tube boilers is, therefore, not in the least impaired by this accident, for in making this claim it is clearly understood that the boiler is to contain water, and not petroleum.

The Screwed Stay Bolts of Fire Boxes

The Engineer (London), April 26, 1901, p. 427.

The outer end of the stay bolt is originally a good fit, and remains so good a fit that leakage is extremely rare. Leakage is all confined to the fire-box. Why? Obviously, if the screwed stay made a water-tight joint in the fire-box plate there would be no leakage, consequently it is clear that in some way or other the stay must become slack and permit water to pass round it. Why the hole is not properly filled is one of the problems that remain to be solved. Some explanations are mere words, signifying nothing. The writer comes to the question of breakage, which he connects with the practice of riveting. Many oppose riveting for this reason: The stays used on the Great Eastern Railway have a hole drilled in each end of the stay, and drifted out with a suitable tool so as to expand the stay tightly in the plate. Other engineers boldly accept the conditions. They say that stay bolts ought to be riveted, and must be riveted, and the writer asks how is the riveting or heading to be carried on without injuring the stay bolt. Bronze in some form has been superceding copper as material for stays. Bronze seems to be uncertain in its behavior if often heated and cooled. *The Engineer* says the best Swedish or Lowmoor rivet iron is unrivalled in quality; it will stand riveting in a way that copper will not, and, as for corrosion, we have never heard of a case where any mischief was done by it. If we retain the copper stay bolt it ought to be so fitted that riveting over on the inner side would be unnecessary. It was at one time the practice with some builders to provide the stay bolts with thin square heads. The bolts were put in from the inside of the fire-box, and a little red and white lead smeared under the head. The stay was then screwed up hard from the inside, and the point was riveted over outside; stays thus fitted lasted a long time and gave no trouble. Years ago we remember, says *The Engineer*, stay bolts fitted with these nuts on the inner ends were being used on the London, Chatham and Dover Railway. It would not be difficult to tap the hole in the inner plate taper, while that in the outer was parallel. A thin tapered stay would of course be equivalent as far as strength is concerned to a riveted stay, the taper being, indeed, analogous to a countersink, and the stay would readily lend itself to slight riveting to secure water-tightness.

The Distribution of Heat in Boilers

The Engineer (London), May 10, 1901, p. 479.

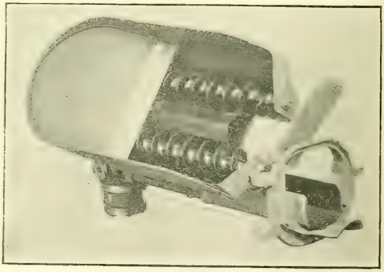
The distribution of heat in boilers is really a question of the distribution of the products of combustion and the radiant heat of the fuel. It involves questions of importance, about which little has been written. On the methods of distribution, among other things, depends the throwing of fire by locomotives, the leakage of tubes and the evolution of smoke. In the case of a water-tube boiler of any make, in which the tubes are of moderate or small diameter and lie nearly horizontal above the fire, there is a large volume of hot gas to pass around the tubes. This gas will take the shortest possible road to the chimney. The air will pass through the grate-bar spaces, and the fuel with moderate regularity of distribution; but the products of combustion will all concentrate themselves towards the central chimney, and the upper rows of tubes close to the sides will be almost untouched. The first rows of tubes over the grate make a species of gridiron, or sieve, the spaces between the tubes forming in the aggregate what is known as the calorimeter of the boiler. It is supposed that contraction of calorimeters will secure equal distribution of gas. The air supply to the fire is evenly distributed if the fuel be spread with the utmost uniformity over the grate. In the Yarrow and Thornycroft boilers the flame will also try to reach the funnel as quickly as possible. The crowding of tubes in order to get more steam is a delusion. It is impossible to have good distribution and prevent smoke if tubes are packed into furnaces which are too small for them. On the subject of fire-throwing by locomotives, Mr. Weatherburn's remedy is to keep down the velocity of flow of the products of combustion by using tubes of good diameter. The great object is to take the velocity out of the small cinders and compel them to fall to the bottom of the box. No one knows how few tubes an engine can get on with, and that without extravagance in fuel; and seeing that tube surface is very expensive and troublesome to maintain, it really seems as if it is worth while to experiment with a view to reducing it.

Mechanical Stoker for Locomotives

Railway and Locomotive Engineering, May, 1901, p. 208.

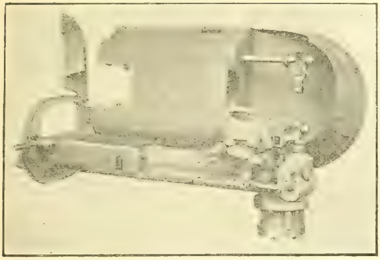
An invention which promises to be one of the most important steps in locomotive practice for many a day is the mechanical stoker which Mr. John Kincaid has brought out.

The hopper A is of sheet metal, and carries the two small screw conveyors shown in the upturned position. These feed the coal forward and in front of the ram or plunger b, which lies in the trough B. The small opening in this is for the escape of dust and dirt accumulating behind the ram. These conveyors are operated by the small engine F H, under front of hopper, through the medium of the ratchet shown.



The piston operating the ram lies inside the casting C, and steam from boiler is connected to pipe shown in front of this. This operates the ram and the small engine, which merely runs the conveyor. The steam chest D is where the valves controling the stroke of the ram are located. There are three of these to give three different impulses to the ram, which distributes the coal alternately over the front, middle and back parts of the grate. These valves are controlled by three cams on one of the conveyor shafts, as can be seen. The three small valve wheels on side of chest D are "choke plugs," which control the amount of steam admitted to each valve so that each can be varied as is found necessary.

The casting E replaces the regular fire-door, and the curved plate in front is a deflector which distributes the coal across the width of the fire-box.



The small door shown, covering the upper portion of fire-box, is to allow inspection of fire and the use of the hook when necessary. This has an outside flange turned up at an angle so that it is lifted automatically by any lump of coal which is too large to go under it, giving an almost unlimited range from slack to large lumps.

A TRIP WITH THE KINCAID STOKER.

The trip described was over a portion of the Chesapeake and Ohio Railroad, and was made on a large engine temporarily fitted with this stoker. The engine has 2,566 feet heating surface, and weighs 186,500 lbs.. The train weighed 1,800 tons, and was composed of 45 cars. On one very heavy up-grade, which took 35 minutes to climb, the mechanical stoker worked at 13 strokes to the minute, and the steam pressure stood at 200 to 205 all the time. The curves at this portion of the road add very considerably to train resistance. A 30-foot grade in the Alleghenies, 12 miles long, was encountered, the train weighing 1,600 tons. This test showed the stoker's ability to keep up steam from 195 to 200 lbs. The return trip was made without the mechanical stoker. The engines of this class are said to be hard steamers, and the thoroughly competent fireman who was employed on this trip failed to get more than 150 lbs. steam pressure.

One of the features of this machine is that it can be connected to the fire-door of any locomotive with a fire-box of the standard type in a very short time, and requires no change in grate. The door is simply removed, the machine attached and connected by a ¾-inch steam pipe for operating.

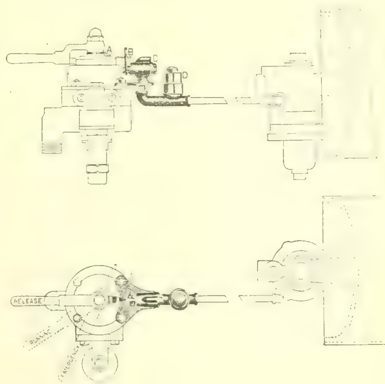
Should anything happen to the machine it can be disconnected in a very few minutes. Mr. Kincaid told of a case of this kind which occurred to his first stoker when it was applied to one of the fast passenger engines. Some little defect made itself known, and the stoker was uncoupled, taken out of the way and hand firing commenced without the engineer closing the throttle or losing a second's time.

There is another point which will be raised—namely, that of dispensing with trained firemen. But firemen will see that this is a false alarm. The mechanical stoker is a fireman's assistant, not his rival. It cannot watch signals, put on the left injector or take the engineer's place in case of accident, but it can give a fireman more opportunity to do all three and make his work easier, as well as helping to get more work out of the engine. Then, too, if anything happens to a machine of this kind, no company would risk tying up a road by trying to get along with a cheap man instead of a fireman.

Michigan Driver Brake Retainer

Railway Master Mechanic, May, 1901, p. 149.

The Michigan Driver Brake Retainer, shown in the engraving, is used to keep the train bunched after the brakes have been released in order to prevent shocks to the train on a second application, and also to prevent the train from parting when the brakes have been released, caused by the forward end of the train surging ahead while the brakes are not fully released on the rear end. This device also facilitates handling the train at crossing and water-crane stops, where the train can be handled with greater dispatch, since all the brakes can be



fully released when the train comes to a stop, allowing the train to start without waiting for the release of brakes. These points are gained by retaining pressure in the driver-brake cylinder at will. The retainer valve consists of two parts, C and D, and is connected with the exhaust port of the triple valve by a ⅜-inch gas pipe. The valve is operated by the reciprocating handle A, which engages with the member B. The retainer valve is bolted to the top flange of the brake valve, using the brake valve's regular joint bolts. The handle A is fastened over the post of the brake valve. The retainer is operated by the movement of the brake valve handle. Pressure is retained in the driver-brake cylinder when the brake valve

handle is in full release position, and released when the brake valve handle is in running position. When the brake valve is brought to full release, the handle is left in that position until all brakes on the train have been released; and in this position 15 pounds pressure is held in the driver-brake cylinder, which keeps the train bunched. When applying brakes to simply reduce speed, the brake valve can be brought to full release and returned to running position, which will release all brakes, including the driver brakes. The device warns an engineer that the driver brake is set when warning port is open; it also causes the engineer to place his brake valve in running position before starting, because his driver brake is set when the brake valve handle is in full release position. This retainer is manufactured under letters patent by the Michigan Lubricator Company, of Detroit, Mich.

Stability of Locomotive Axles

Bulletin, International Railway Congress, April, 1901, p. 662.

Methods of increasing the stability of locomotive axles when running. Combined effect of very flexible springs and equalizing levers on the preservation of static loads and the stability of engines.

CONCLUSIONS.

Compensating levers are of advantage, chiefly on lines with varying gradients or frequent curves, as they tend to diminish the irregularity of load on the wheels when curves are entered and changes of gradient encountered. On fairly level lines, with permanent way maintained in good condition, experience shows that locomotives which are not fitted with compensating levers are capable of doing excellent work. Springs of great range appear to have but a limited field of application in locomotive practice.

Car Equipment, Appliances and Related Matters

Present and Future Cast Iron Car Wheels

Iron Trade Review, May 16, 1901, p. 19.

This article is by Mr. William Faucett, of St. Charles, Mo. After detailing the M. C. B. physical and thermal tests for cast iron car wheels, he says: It is safe to assume that the wheel maker can easily meet the drop and thermal tests and give the required depth of chill, and also show the inspector a clean, soft, grey iron plate in all test wheels when broken, but the life and mileage may still be unsatisfactory. Is it not unwisdom for superintendents of motive power to arrogate to themselves the right of absolute dictation in having plates of all wheels when broken show a clean, soft, grey iron, without any white or mottled appearance? It is well known to progressive wheel manufacturers that a car wheel to give six years' service under heavy loaded freight cars running at a high speed requires to be cast with a strong, mottled, hard, dense, close, homogeneous chilling metal, which is known to them from long experience to have excellent qualities for wearing surfaces, and give to tread or chilled portion a close, dense-grained metal, possessing all the qualities of a steel-tired wheel. The manufacturers are obliged to live strictly up to the specifications to have their product pass inspection and show a clean, soft, grey metal plate regardless of the consequences which are sure to follow. The lines are too closely drawn on the depth of chill. It may be asked why railroad officials should dictate to the wheel maker the exact depth of chill, and also demand clean, soft, grey plates, and then specify six years' service with every wheel? Would it not be wisdom for them to leave the depth of chill and the softness of the plates to the discretion of the wheel maker, or else make this uncalled for inspection an absolute mileage guarantee?

The writer proposes that the railroads shall specify a certain chemical composition for their wheels, and that the manufacturer shall comply by buying suitable iron and produce the wheel required by melting in a suitable cupola and running the molten metal into an open-hearth gas furnace, to be kept there under a proper temperature until all objectionable elements mentioned in the specification are taken out of the metal, and those required are chemically added and chemically united. The open-hearth gas furnaces are intended to be of the latest and best designs and under the direction of a metallurgist of ability. After the molten metal has remained in the open-hearth furnace until it is known to be of the proper temperature and chemical composition, it is to be drawn off and wheels poured at the same temperature, thus giving to the product an even shrinkage, a uniform depth of chill and physical strength far beyond the requirements of ordinary usage. There will be cast on each wheel a spur about 1½ inches high. The wheel inspector on looking over each day's cast for foundry defects will break off as many spurs as he may deem proper and send them to the railroad's chemical laboratory, where a careful analysis will be made for all elements, and if the specimens all come within the lines drawn in the wheel specifications, that day's cast shall be accepted. If elements are found on the outside of those lines that day's cast will be rejected.

Standard Box Car

Leonard's Railway News, May 4, 1901, p. 2.

The special committee report of the American Railway Association relative to standard construction of box cars says that the essential element of a box car is that the height and width shall accord with the physical limitations of railroad clearances and the established height of loading platforms; and that the length is to be determined by economy in construction, maintenance and operation and the requirements of economical stowage. The committee believes that the traffic rules should be so framed as to provide that there shall be no pecuniary advantage to any interest arising from the use of cars larger or smaller than the unit car; that a premium should be placed upon compact and economical stowage; that unnecessary movements and detentions of cars should be avoided; that clerical work should not be excessive, and that a railroad should be sustained in the control of its equipment. The car recommended by the committee as standard is 36 feet long, 8 feet 6 inches wide and 7 feet 6 inches high, inside dimensions, with a cross-sectional area of 63.75 square feet and a capacity of 2,295 cubic feet, and that this car shall be the unit upon which the classification minimum shall be based. The committee further recommends the following: That the minimum rate for each article per carload be adjusted to the capacity of the unit car holding such commodity most economically packed; that to conserve the use of cars 34 feet long the minimum demanded for them shall approximate nearly to their capacity, and that for each article the minimum rate shall be fixed at the capacity of a car 34 feet long, 8 feet 6 inches wide, and 7 feet 6 inches high; that for cars shorter than 34 feet the minimum rate shall be that of the 34-foot car, thus making them relatively uneconomical to the shipper, and that for cars longer than 36 feet the minimum charge shall increase at the ratio of the increase in length.

Car Heating

Le Genie Civil, May 18, 1901, p. 37.

The principal system used at present by the French and foreign companies may be divided into four classes: 1. Rudimentary systems of heating; 2, Systems based on the use of the thermo-syphon; 3, Systems based upon the use of steam or of steam and water combined; 4, Heating by electricity.

The article then goes on to describe in detail the various systems. In the first class are the use of cans of hot water, cans of acetate of soda, briquettes and of stoves.

The second class includes the system used on the Northern Railroad of France, with a separate boiler and circulating pipes. The article will be continued through several issues.

American Steel Foundry Company's Steel Cars

American Engineer and Railroad Journal, May, 1901, p. 156.

A number of types of steel cars have been designed by the American Steel Foundry Company of St. Louis. The three engravings presented here illustrate the exterior appearance of a hopper car of 110,000 lbs. capacity for the Chicago & Alton, a drop bottom gondola of 80,000 lbs. for the El Paso & Northeastern and also a test weight car for the Chicago & Alton. The Delaware & Hudson has also received a number of 80,000-lb. cars exactly similar to this drop bottom gondola. Detailed descriptions of the under-frames and structural features are not available at this time. Standard rolled steel shapes and plates are used throughout the cars. They are mounted on steel trucks as made by these builders, having cast steel truck bolsters and special channel shaped arch bars. The test car, however, has only four wheels.

The gondola car has substantial center sills of plates and angles, the depth at the center being 22 in., tapering at both ends. The draft gear is placed between the center sills. The floor plates are laid on Z-bars placed between the center sills and side plates. At the side the floor plates have additional support from angles riveted to the floor and side plates. The bolsters are built up and riveted to the center sills which are not cut. Angles in the form of stakes are riveted to the side plates as stiffeners. These cars have four drop doors and small side doors through the side plates at each end. The gondola cars of 40 tons capacity weigh 31,000 lbs. empty.

Hopper cars without continuous center sills are novel. These cars for the Chicago and Alton are built in this way, the hopper being entirely free from obstructions inside, and the load is carried at the sides by a plate girder 30 ins. deep, with angles at the top and bottom. These girders extend the whole length of the car. The side plates of the hoppers are riveted to these girders, forming a strong arrangement. Side stakes of angles extend from the top of the sides to the bottom of the plate girder, passing the upper girder angles by offset bends. At the center of the car substantial stiffening is secured by a partition or bulkhead across from side to side, dividing the interior of the hopper in the center. The end structure is substantially braced, and the draft gear is placed between short center sills, which do not pass through the hopper ends. No special effort was made to secure light weight, these cars weighing empty, 41,200 pounds.

110,000-POUND CAPACITY HOPPER CAR—CHICAGO & ALTON RAILWAY

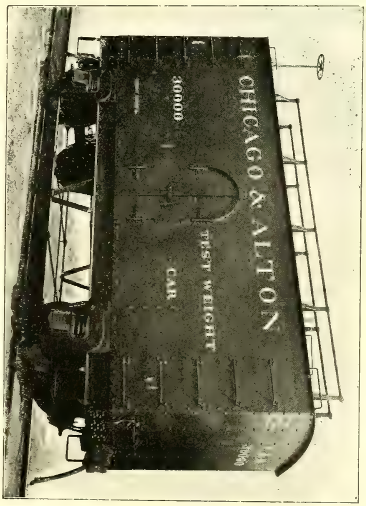
Rail Cars

Engineering News, May 9, 1901, p. 343.

The Lorain Steel Company, of Lorain, Ohio, has a long gondola car for transporting its 60-foot girder rails for street car track. The cars measure 63 feet 4 inches inside, and have been in service for nearly two years. The Cleveland, Lorain and Wheeling Railway is using 38-foot gondolas for carrying long rails, each car having a movable gate at one end; they are thus used in pairs. These cars are 80,000 lbs. capacity and are of substantial design, intended for heavy service. One end of the car is fixed, and is similar to the side construction, the corners being heavily strapped. At this end is placed a hand wheel for brakes. At the opposite end of the car is a portable end gate. Permanent safety chains are provided at the end having the gate, so that two cars coupled together with end gates or doors removed can be safely used for transporting long rails, which form a considerable item of traffic on this road. The cars carry their full rated load as an average, including slack and all other grades of soft coal. With run-of-mine or lump coal they are loaded to 88,000 lbs., and in some cases the cars have been loaded with 91,000 lbs. of soft coal. They were loaded to full limit on their initial trip, and no cut journals or hot boxes resulted. The company has 800 of these cars in service and 500 more under construction.

A two-page plate accompanies this article.

[The 66-foot rail cars are similar to, if not identical with, the long cars owned by the Lake Terminal Railroad of Lorain, which were described in the February number of the DIGEST, page 60.—EDS. RAILROAD DIGEST.]



TEST WEIGHT CAR—CHICAGO & ALTON RAILWAY

Shop Practice, Machinery and Tools

Truing Up Railway Wheels

Trade Journals Review (London), May 15, 1901, p. 105.

A simple device has been put in practice in America for truing up railway carriage wheels, and it is said to be quite successful. It consists of a brake shoe, which is formed with pockets filled with a grinding material. When a wheel becomes flattened, it is necessary only to remove the regular shoe and replace it with the truing shoe, run the carriage, do the braking as usual, and in a short time the wheel becomes as true as ever. We accept this statement with some reserve. It may be true that a device of this kind would serve to remove the more prominent irregularities, but that it will make the wheel run as true as if it had been re-turned we cannot altogether believe.

Pulleys and Belts

Steam Engineering, March, 1901, p. 200.

One often hears the question discussed whether a belt will run toward the high or toward the low side of a pulley. It is asserted by some that they have seen belts run toward the low side, while others are equally positive that a belt will always and invariably run toward the high side. When it is understood what each person means, it will be found probably that both are correct. A belt will run, sometimes toward the "high" side, and sometimes toward the "low" side, according to what is meant by the terms high side and low side. If two shafts are out of line, so that at one end they are nearer together than at the other end, the belts connecting the two shafts will always tend to run toward the ends of the shafts that are the nearer together. The tendency in this case is for the belt to "run down hill," as it were. But when the shafts are lined up nicely and the pulleys themselves are turned larger on one side than on the other, or are crowned in the center, the belt will climb toward that portion of the pulley that is of the largest diameter. In the case of crowned pulleys, both edges of the belt tend to work toward the center of the pulley, and thus there is no tendency for the belt to run off. In the case of a pair of tapered cone drums, the belt will run toward the large diameters of the drums.

Photographing Drawings

Machinery, April 1901, p. 237.

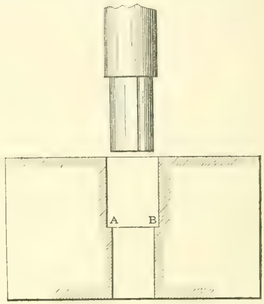
This process consists in suspending from the ceiling a frame which holds a camera, two electric arc lights and a board upon which the drawing is pinned. The object of suspending the apparatus is to avoid the vibrations of the building due to modern machinery or the slamming of doors. The photograph may be taken by night or day. The lens must be capable of copying straight lines without the least diffusion or abberation. The usual photogrophic dry plate is too "soft"; plates which will yield very dense black negatives are required. "Process" plates suitable for this work can be had from almost any dealer for about $3.80 per dozen for the 10x12 size, and a drawing of 25x30 inches may be reduced to the 10x12 size and still have all the figures legible. Process plates dry very quickly. The photographic process makes dark lines on a light ground. There may be a little difficulty experienced in copying blue prints owing to the fact that blue is the most actinic color. Blue "takes light" and so gives very little contrast. This difficulty may be overcome by saturating a swab of cotton with ammonia and holding it near the blue print. The fumes of the ammonia will cause the print to turn dark purple, which will photograph well, that is to say, it will not photograph at all, but will permit the white lines to appear in strong contrast.

Almost any kind of printing paper may be used. The familiar blue print paper yields dark blue lines on a white ground. "Maduro" paper (Keuffel & Esser Co., N. Y.) gives dark brown lines on a white ground. The best paper for copying line drawings is "Velox," which may be had from all photo. dealers. This gives jet black lines on a pure white ground, even reproducing the slight gloss of the ink. This photographic process is advocated for several reasons. One advantage is that prints of this character are said to be far superior to half-tone engravings and for a limited edition, say for catalogues, and much cheaper.

Shrink Fits and Fixing Babbitt in Bearings

American Machinist, May 2, 1901, p. 483.

In the establishment of H. Bollinckx, of Brussels, Belgium, they dispense almost, if not entirely, with keys in erecting their engines, and depend upon pressed or shrunk fits. In this connection, Mr. Bollinckx sends the Machinist a sketch, Fig. I, which he explains as follows: "In order to easily press the rod or shaft into place, we give it two diameters, and we also



bore the piece into which it is to be pressed in two diameters to correspond. In this way we are able to introduce the rod or shaft for half its bearing before the pressing or driving begins, so that we have to press it only half the distance that would otherwise be necessary; and, besides, the shaft is accurately guided from the start, and has little tendency to cut or grind. The heavy line on the smaller diameter of the shaft, Fig. I, is a groove made there to permit the escape of the air, which would otherwise be caught between the two shoulders and would have no means of exit."

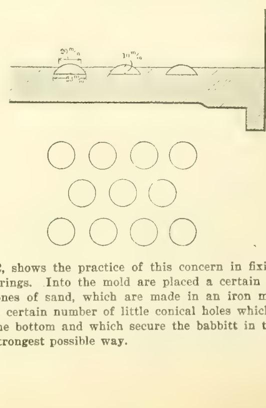


Fig. 2, shows the practice of this concern in fixing babbitt into bearings. Into the mold are placed a certain number of small cones of sand, which are made in an iron mold. This causes a certain number of little conical holes which are largest at the bottom and which secure the babbitt in the bearing in the strongest possible way.

Electric Equipment, Machinery and Appliances

Motors for the New York "L"

Street Railway Journal, May 11, 1901, p. 573.

One of the largest contracts for electrical equipment ever awarded in this country was closed May 1 between the Manhattan Elevated Railway, of New York, and the General Electric Company. Over $3,000,000 is involved. The contract provides for the electrical equipment of 800 motor cars and 400 trailers. Each of the motor cars will be provided with two motors, which makes a total of 1,600 motors to be furnished. The General Electric system of multiple-unit control will be used. The company plans to run six-car trains, of which the first, third, fourth and sixth cars will be motor cars. The existing equipment will be used for the rolling stock. A number of new motor cars will be required however, and an order for one hundred will soon be placed.

More Niagara Power

Electrical World and Engineer, May 11, 1901, p. 775.

It will be officially announced by the Niagara Falls Power Company that it will at once proceed with the development of the power of the Horshoe Falls under the charter of the Canadian Power Company, which it controls. The contract has been let to A. C. Douglass. The present plan of the company is to develop 35,000 horse-power. One-third of this will be used to operate an industrial establishment outside Victoria Park on the Canadian side. Another third is to be transmitted to Toronto, and the remaining third is to be held in reserve for the use of the Niagara Falls Power Company on the American side of the river. The two power houses of the company in Niagara Falls, N. Y., and the new power house on the Canadian side will be connected. The plan for development calls for the construction of an inlet canal from Cedar Island to the power house site, where the wheel pit will be sunk, a tunnel carrying the water to the lower river below the Horseshoe Falls. This pit and tunnel will have a capacity of 100,000 horse-power. The Niagara Falls Power Company will finance the undertaking.

Sectional Third-Rail System on the B. & O.

Electrical Review, April 6, 1901, p. 423.

This article by Mr. Henry Hale describes the electrical system by which traffic is operated on the Baltimore and Ohio Belt Road. The locomotives weigh 96 tons each, and are equipped with four General Electric motors, mounted directly upon the axles. The motors develop 300 horse-power each, giving them the ability to pull 2,000 to 2,500 tons through the tunnels and approaches without difficulty.

The third-rail is charged from the power house, and is fed from a cable which is carried in a vitrified conduit filled with some insulating compound. The current, however, cannot pass direct to the third-rail. At each section of this rail is a magnetic switch, which in its normal position cuts off all contact with the wire from the power house. In order to get current into one section of the third-rail it is necessary that this magnetic switch shall be closed, and this the locomotive does as it moves along. The means of operating the switch is briefly as follows: When the handle of the controller is turned to the first notch this opens the throttle of a small air engine which is supplied with compressed air from a storage reservoir in connection with the air-brake system. This air engine drives an electric generator, which generates sufficient electricity to operate the magnetic switch, and so permits current from the cable to feed into a section of the third-rail. The magnetic switches have a capacity of 2,000 amperes each and are enclosed in weather-proof boxes. The switch is practically a solenoid with two windings, one a fine winding with many turns around the magnet, taking a current of about 550 volts from the generator on the locomotive through the controller, the contact shoe and the third-rail. This current raises a plunger, which closes the switch and feeds the power-house current of 700 volts to the third-rail. The moment the weaker current from the generator passes through the fine winding and closes the switch, current from the power-house passes through the heavy winding of the magnet and keeps the switch closed until the contact shoes of the electric locomotive have passed to the next station. The circuits around the magnet being broken the switch opens by gravity.

When the third-rail is active, current passes through contact shoe and controller to the electric generator which operated the switch, and also to the four motors of the locomotive. Immediately and automatically the little generator becomes a motor, operated by current from the power-house, and drives the air-engine as an air-compressor, recharging the compressed air reservoir. At no time is it possible during the operation of this system to have a charged conductor or third-rail except when the motorman has turned the controller and then only one is charged, *i. e.*, the section on which the electric locomotive is operating. The section is "dead" while the locomotive is standing. Mr. John M. Murphy is the inventor of this variety of sectional system.

Electric Theory of Hot Boxes

Railway and Locomotive Engineering, May, 1901, p. 200.

The Joseph Dixon Crucible Company writes to *Locomotive Engineering* regarding the latter's editorial on the "Electric Theory of Hot Boxes." The communication says in part: Scientists write that if two carefully cleaned pieces of glass are placed one upon the other and pressed together they will adhere very strongly. So will pieces of marble. As both these are non-conductors, is this due to electricity, or to the fact that like surfaces "seize" each other? We think that graphite prevents such seizure on account of its lubricating qualities, and not because of its non-conductivity, since it is an excellent conductor. Oil lubricates by filling up the inequalities of the bearing surfaces with its globules, and lifts the opposing surfaces above such irregularities and forms of a new surface, consisting practically of an innumerable series of microscopic but perfect ball bearings, exchanging the friction of solid bodies for a fluid friction. As graphite is soft and yielding, there is never any danger of the surfaces locking or "seizing."

[We believe that the so-called "seizing" of like surfaces which have been made very smooth is due to the more or less perfect exclusion of the air between them, and is not due to any electrical or frictional agency. Plates of glass with a film of water or oil between them adhere very closely. The fact that graphite prevents such adhesions may probably be due to the fact that in a finely divided state graphite contains small particles of air.—EDS. RAILROAD DIGEST.]

A Recording Telephone

American Manufacturer, May 23, 1901, p. 639.

The recording telephone, or telegraphone, as it has been named by its inventor, Valdemar Paulsen, of Copenhagen, Sweden, is now being exhibited in England. The apparatus, which can be used in substitution for, or in co-operation with, any ordinary telephone receiver, consists essentially of a long steel wire or ribbon, which passes rather rapidly before the poles of a small electro-magnet. This electro-magnet, which is wound with very many turns of exceedingly fine wire, is inserted in the telephone circuit by the current in which it is magnetized. The steel wire is, of course, also magnetized, and the essence of the machine lies in the fact that the magnetism induced in successive portions of the wire varies in agreement with the undulations of the electric current in the telephone circuit, produced by the voice of the speaker. To read the message, it is only necessary to pass the steel wire in the same direction past the poles of the same or similar electro-magnet, when the same undulations will be set up in the current passing

through its coils and consequently the same sounds reproduced in the attached receiver. These reproduced sounds are remarkably true and pure. It is said that the same message may be reproduced from what may be called the sensitised ribbon an indefinite number of times, but if it is desired to remove the record, that can be simply effected by subjecting the wire to a constant magnetising force, such as is obtained by passing an unvarying current through the electro magnet.

[This invention appears to possess the telephone and phonograph principles in combination. It can easily be, if it is not now, so arranged that the use of the telephone would automatically start the steel ribbon moving, so that a message could be recorded, even if no one "received" it at the time, just as the telautograph does. Such a device as this might facilitate train dispatching by telephone.—Eds. Railroad Digest.]

Electro-Magnets for Iron Working Plants

Machinery, May, 1901, p. 279.

This article is by Mr. William Baxter, Jr. He says, Electro-magnets are used to a greater extent in iron-working establishments than is generally supposed. In rolling mills they are used to lift large boiler plates, and they afford decided advantages over other methods. The magnets are suspended from the hooks of the lifting crane, and are so disposed that they pick up the plate at several points, so as to prevent it from swinging around into contact with nearby objects, and to obviate any danger of the plate bending under its own weight. In machine shops, electro-magnetic chucks are used to hold work in planers, shapers, lathes and other tools.

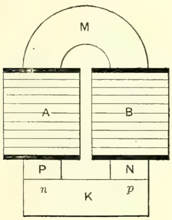


FIG. 1

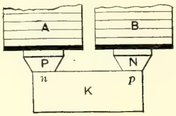


FIG 2

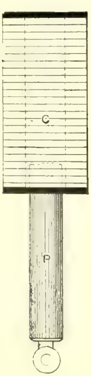


FIG 3

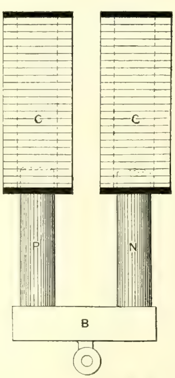
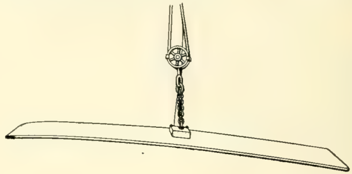


FIG. 4

For lifting, the ordinary horse-shoe type shown in Fig. 1 is the most efficient. In this figure M is the magnet core, A, B are the magnetizing coils, while K is the keeper or armature. If the area of the ends of the poles is reduced as in Fig. 2, the lifting capacity of the magnet is increased, though in such a case the "leakage fringe" as it is called will be greater than in such a magnet as is shown in Fig. 1.



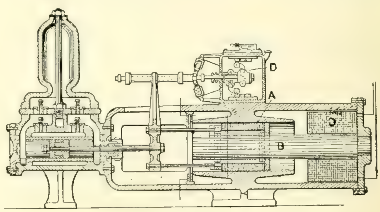
In many instances it is desirable to have magnets that will exert a small force but which will act over a greater distance. Such results can be obtained with the form of magnet known as the solenoid, which consists of one or two wire coils and an iron plunger which is drawn into the core by the magnetic attraction. A single coil solenoid is illustrated in Fig. 3, and a double coil or horseshoe solenoid, in Fig. 4. If the coil of a solenoid is encased in an iron tube its force will be increased.

In the foregoing article the why and wherefore of the whole subject are gone into very thoroughly, and two tables are given for aid in making calculations.

Direct-Acting Electric Pump

Steam Engineering, May, 1901, p. 273.

The accompanying cut illustrates the principle of a direct-acting electric pump recently patented. Reciprocating action of the pump plunger is obtained by the reaction of a solenoid magnet A on the stationary core B, which is also magnetized by the coil C. The solenoid is tied to the pump plunger by the rods shown, connecting by a yoke. The yoke carries an arm which operates the reversing mechanism by striking tappets at the ends of the stroke. By this action the direction of the electric current is reversed, which causes a reversal of the movement of the solenoid. The box D contains the electric contact mechanism and is filled with glycerine to prevent destructive sparking when the contacts are broken. Of course the pump end does not necessarily differ in any manner from that of an ordinary pump.



Electric Pump.

Telegraph Wires Laid on Snow

Consular Reports, May 21, 1901, p. 5.

Consul-General Guenther, of Frankfort, says that, according to experiments conducted by Mr. H. Janssen on Mont Blanc, it is not necessary to erect poles for stringing telephone and telegraph wires in snow-covered countries. If the snow is several

inches thick, it serves as a good insulation; the wires can simply be laid down and be ready for transmission of messages. The Consul-General adds that similar experiments with equally favorable results were made on Mount Aetna.

Wireless Telegraphy

The Mechanical Engineer (London), May 4, 1901, p. 615.

While H. M. S. *Majestic*, of the Channel Squadron, was on her way from Portsmouth to Berehaven, she accomplished a remarkable record in wireless telegraphy. At intervals of every 15 minutes, messages were sent and received between the *Majestic*, and the station at Portsmouth until she had reached a distance of 90 miles from Portsmouth. The station at Portland was then tapped, and by this means the *Majestic* was able to keep up communication with the shore until she was 103 miles out to sea.

Conducting Transportation

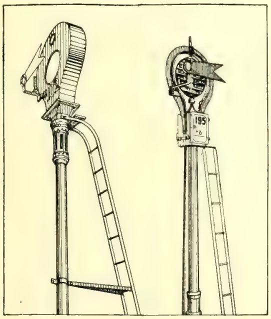
A Railroad Puzzle

A gentleman recently submitted the following puzzle to a party of friends seated around the festive board: "The distance from New York to Chicago is 998 miles. Two trains start, one from each city, and of course move toward each other. The train leaving New York travels at the rate of 60 miles an hour, and makes an average of three stops per hour, representing a loss of 10 minutes in every sixty. The other train leaving Chicago, has 15 minutes clear start, but runs at the rate of only 30 miles an hour and without stops. At the passing point, which will be farthest from New York?" The Digest will be pleased to receive correct answers.

Out of Order Indicator for Automatic Signals

Railway Signaling Club, May 14, 1901.

E. D. Wileman, Signal Engineer, L. S. & M. S. Ry., read a paper on automatic block signals at the meeting of the Railway Signalling Club. He said that in the experience of the Lake Shore & Michigan Southern Railway, dissatisfaction had arisen at times with the ordinary way of showing that a signal was



out of service. The usual practice of hanging a green disc over the number, which could be blown off in a very high wind, or by using rough devices by the maintainers when the regular disc was lost or damaged, such as the tying on of an old piece of gunny sack or any fabric, large enough to cover the number, was most unsatisfactory. Thus it was impossible to get a night indication from such devices. To remedy this, Mr. Walter Gravit, assistant master carpenter at Elkhart, devised a small fish-tail blade so attached as to hide the number and permit the use of the regular lamp to give a corresponding night indication. Afterwards the device was changed to stand full in front of the regular signal disc, so that there should be no change in the location of the indication, thereby exposing the number and enabling the engineer to see it. The blade with its glass and bracket is all one piece and can be easily placed in the small socket which is permanently placed on each signal. Each maintainer has one or two of these blades, according to the number of signals he has to care for, and can easily take a blade with him when going to a defective signal. Should his territory be large, one or more could be kept in the nearest section house. The details are made clear by the accompanying illustration. Each indicator costs about $4.75.

Platform Tickets

There is, perhaps, one thing which we might import from Germany. It is the system of issuing "platform tickets," at railway stations, upon payment of a small fee. In many of the cities of the United States, the non-traveling friend must part from the traveler before the latter reaches his or her car. For instance the husband very often cannot carry the wife's hand bag for her to the car, but must give it up at the gate leading to the platform. The same might be said of friend meeting friend at an incoming train. The "platform ticket" sold for a trifle would permit those who have legitimate business on a railway platform to get there, while the price would be sufficient to keep the public at large from crowding in, and occupying space which ought to be kept clear. The sale of such tickets would, of course, be an additional source of revenue to the company. In Berlin these tickets may be had from coin-in-the-slot machines.

Ill at His Post

New York Tribune, May 13, 1901, p. 6.

A telegraph operator at a railroad station in New Jersey became suddenly ill while on duty a few days ago, and, according to the report made to the authorities, "fell in a faint." This occurred at a point where the operator's duty includes setting the semaphore by which the locomotive engineers may know whether the track ahead is clear. It gives them the mute order to "Go ahead!" or "Stop!" Fortunately for the passengers on the trains which pass that point at frequent intervals, the operator had set the block when he was overcome, and trains were stopped and disaster was averted. Had the operator been stricken before the block was set, loss of life and property might have been the result; and the incident naturally suggests the need of an arrangement which would preclude that possibility. A signal tower in charge of one man, who may become ill or incapacitated at any moment, is not a perfect safeguard, and the consideration of what might have resulted from the illness of the operator on the New Jersey line should serve as a warning and a stimulus to improvement.

Increasing the Revenue Train Load

Railroad Gazette, May 24, 1901, p. 343.

Mr. F. F. Gaines, of the Lehigh Valley Railroad, read a paper at the May meeting of the New York Railway Club, in which he said that one of the largest of the economies that have been recently introduced is the concentration of trainload on a short total wheel base by the use of large capacity cars. After enumerating a number of methods of producing small economies, some of which still required further study, Mr. Gaines mentioned the resistance offered to a train by a curve. He said: A train of cars being hauled through a curve is like the checking of the pull on a rope by taking a turn around a post and pulling on the free end. The resistance necessary to be overcome in hauling the rear of the train is similar to the pull on the free end of the rope, the curve (together with this pull) furnishes the restraining force in the form of flange friction.

It is also probable that the rolling friction between rail and wheel is not altogether in proportion to the weight on the wheel, so that for two trains of equal weight on a straight and level track that which has the fewer number of wheels will offer the less resistance. He found, he said, that a train of average empty cars, each about 15 tons light weight, requires 30 per cent. more power for the same tonnage, or the same engine can only handle 70 per cent. of the weight of an average loaded train composed of 60,000-lb. capacity cars.

SYSTEMATIC LUBRICATION OF CENTRE PLATES

The value of systematic lubrication of centre plates is beginning to receive attention. It has been found that lubrication of centre plates, when properly applied, greatly reduces flange friction and increases the revenue load. It would also seem reasonable that there is a choice of the material to be used. Is malleable iron, cast iron or pressed steel the best adapted for good contact and reduction of friction? Brake beams are often wrongly hung, allowing one end of the shoe to drag on the wheel. This cause of friction can easily be eliminated. Care should also be taken to see that wheels are not mismated, as this also causes friction and produces corresponding loss.

Methods of Dealing with Snow

Bulletin, International Railway Congress, April, 1901, p. 632.

Means adopted for preventing the accumulation of snow on the line and for clearing it away. Consideration of the results obtained since the Milan session (1887) from the point of view of safety and economy.

CONCLUSIONS.

1. Protection against the formation of drifts.

(*a*) All managements whose lines are threatened with the formation of snowdrifts have realized the necessity of counteracting this danger by erections and protective measures.

(*b*) The various protective erections have everywhere been considered very seriously with a view to progressive improvemnts, and the course pursued has depended upon practical data.

(*c*) Quickset hedges, plantations of trees and especially the planting of bare or denuded country are the chief measures recommended.

2. Means of clearing the track.

(*a*) The tendency to increase the use of snow ploughs attached in front of locomotives and to add to their weight and power is noticeable.

(*b*) In countries subject to immense snowdrifts the use of machines of a rotary type for clearing the snow by mechanical means seems indicated.

The Telephone in Railway Signaling

Electrical Review, May 11, 1901, p. 570.

Railway managers regard with much interest the experiment of the Erie Railroad Company in equipping its block stations with telephones. It has not been attempted to do away with the ordinary telegraph block signaling system with telephones, but the latter have been found to be an adjunct of great utility. As a special training is not needed for their operation, the company has a large field from which to recruit its force of signalmen, and in many cases the telegraph signal has actually become superfluous. While it takes some time to learn to telegraph accurately, any man who can talk and hear, can operate a telephone.

Baggage Checking for Buffalo

Leonard's Railway News, May 11, 1901, p. 4.

The numerous estrays and losses of checked baggage during the World's Fair at Chicago, have resulted in a system that will insure reasonable safety to Buffalo exposition tourists. The Buffalo terminal lines Baggage Committee has issued a letter to its connections, asking that especial care be exercised and that rules it has framed be adopted. Checks upon Buffalo baggage during the period of the exposition must show the checking point, route and destination. Trunks and all other articles are to bear the names and addresses of their owners, and the checking of satchels and small articles is to be discouraged. Attention is called to the fact that during previous heavy movements of passenger traffic the majority of losses and estrays was due to carelessness of owner, and baggage-men are requested to insist that articles shall be checked by their owners in person rather than by hackmen, expressmen or friends.

Medical and Surgical Matters

Reform in Car Furnishings

International Journal of Surgery, May, 1901, p. 161.

The writer of this article begins by quoting the New York Herald. "A young man on his way home from Florida died in a sleeping car from consumption. If the car had been fitted with the prevailing heavy curtainings and upholsteries the danger to the health of the next occupant of the berth in which he died is obvious."

For the last eight years the members of the New York State Association of Railway Surgeons have discussed and pointed out to railway officials the great danger of allowing sick with contagious disease to mingle with fellow passengers on trains and the absolute necessity of car sanitation and the disinfection of all cars, especially sleepers. During all these years the good work of all our associations has in this respect, and, in fact, in every way, received the hearty support of the *Journal of Surgery*.

North British Railway Ambulance Competition

Transport (London), April 26, 1901, p. 342.

The seventh ambulance competition for the North British Railway Ambulance Challenge Cup took place in Glasgow on the 20th April, under the St. Andrew's Ambulance Association. The examiners were Drs. E. Price and Thos. Proudfoot, of Edinburgh and Dr. Robert Grieve, of Glasgow. Miss Laird, daughter of Sir Wm. Laird, chairman of the company, showed her interest in the ambulance work of the staff by presenting five silver medallions, one of which will be presented to each member of the second best team. The challenge cup is held for one year; each member of the winning team receives a gold medallion. The total number of North British railway servants who hold certificates of proficiency in ambulance work, is 1857, of which number 136 qualified during the past year. Many of the officers of the company were present and witnessed the competition and the awarding of prizes.

Decomposition of the Visual Purple

Jewelers Review, May 8, 1901, p. 879.

Recently two workmen in Ohio, while burning out the combination to a safe by means of an incandescent arc light, were attacked by headache and dizziness, and finally both became totally blind. The Review states that the visual purple of the human eye undergoes a certain stage of decomposition when subjected to the focussed rays emanating from an incandescent body, and when the eyes are fixed upon such, for even a period of thirty seconds, a more or less central scotoma is manifested, the duration of which depends on the physical condition of the retina. Had these men used the Bessemer and Open Hearth spectacles, used by puddlers and those who work around the melting pots in steel mills, they would have experienced no untoward effects. The Bessemer lens is a combination of orange, blue and red; and the Open Hearth is made of blue glass of about the density of cobalt.

The New York, Ontario & Western Railway has ordered one standard single-track snow plow, size No. 1, from Mr. W. E. Wilder, 355 Boyleston street, Boston, Mass.

Miscellaneous

American vs. British Engineering

The Times (London), Weekly Edition, May 10, 1901, p. 310.

Mr. Wm. Garrett, of Cleveland, Ohio, read a paper at the thirty-second annual meeting of the Iron and Steel Institute of Great Britain not long ago. He started upon the assumption, which he put as a fact, that the supremacy so long held by Great Britain as regards her iron and steel trade had been lost, and he then proceeded to indicate how it might be recovered. He was unsparing in his criticisms of British machinery and methods of manufacture, and went *seriatim* through the various departments of a British steel works, analyzing step by step every progressive phase of manufacture and comparing it with American practice. One reason given for Britain falling behind was that up to the present time it had had no competition. Mr. Garrett said a good word for the British workman, who, he insisted, could be as active and energetic as the American workman if it was his desire. He also asserted that the best men at the rod mills he ever saw were British workmen in England. The speaker then told the British steelmakers that beyond improved machinery and methods their salvation lay in combination.

A prolonged discussion followed, in which British steelmakers successfully met his allegations upon technical points, showing that in some instances English manufacturers had been doing what Mr. Garrett charged them with not doing long before the same thing had been done in America. It was pointed out that the strength of the American manufacturer lay in protection, and it was suggested by one speaker that those who had charge of the tariff machine should fit it up with reversing gear. As regards the readiness of American manufacturers to throw aside costly plant and machinery at a moment's notice and to erect new, it was pointed out that that was but the natural outcome of the readiness with which the American public poured their dollars into the manufacturers' laps.

British and American Steel Making

Engineering (London), May 17, 1901, p. 641.

Engineering says that the recent paper read by Mr. William Garrett on "American and British Rolling Mill Practice," before the Iron and Steel Institute, deserves far more acknowledgment than it has received. In the discussion following the reading of the paper, many of the speakers struck a keynote of complaint, in which Engineering does not join, as it thinks Mr. Garrett's paper was as friendly as it was able and outspoken. Engineering goes on to say that "concerning the richness of the American ores, the splendid facilities for their mining and transport, the low price of coke, and the advanced blast-furnace practice of America, we should like to have this opinion as to equality of cost in production of pig between America and Great Britain, confirmed by detailed information." One of Mr. Garrett's chief criticisms, was the way in which the British lose time. This would be overcome if their small merchant and rod mills were adapted to take 4-in. billets. If the 4-in. billet is more economical to work than the 2-in. billet, English manufacturers should make it suitable and economical to use it. This is where the American manufacturer is ahead of his British compeer. His instinct is to rule events, whereas the Briton allows events to rule him.

Mr. Garrett asks why the English do not make a larger tonnage in rails. If the reply is that there is no market for them, Mr. Garrett wants to know why. Engineering thinks that American steel-makers easily induce foreign customers to accept standard sizes when lower price and quickness of delivery is the inducement. So long as Americans can, by combination, make large profits on a protected home supply, careless whether they sell abroad at little or no profit, or even less than no profit, they cannot claim to have proved an industrial triumph over foreign rivals. "I may be wrong," said Mr. Garrett, "but I will venture to assert that for the last ten years, all the British iron and steel manufacturers together did not spend as much money on improvements as the Carnegie Steel Company did in two years." The assertion was not proved to be wrong. The British tendency seems to be to cling tenaciously to old methods, and when such are known to be behind the times, they are so grudgingly abandoned that before the new method is fully taken up it has become old in the eyes of Americans. It has taken Great Britain five or seven years to appreciate the value of American improvements, and during that time they had grown out of date in the land where they originated.

British Manufacturers and Trades Unions

Commercial Advertiser (New York), May 20, p. 4.

That British trades unions have begun to learn an urgently needed lesson is suggested by a London despatch, according to which labor leaders are taking part in the formation of a national federation of employers and trades unions. If the unions agree to the only possible conditions which could make their part in such a federation increase the efficiency of British industry it is difficult to overestimate the importance of such a step. Hitherto their rigid organization has held the employers at arm's length, and by minute and unreasonable restrictions as to output and working hours has done more to put British manufacturers at a disadvantage in competition than any other cause. More than likely they have begun to feel the pinch of American competition in certain lines, and their leaders have been forced to see their share of responsibility for the general situation. Hitherto they have refused to see that, or, rather, they have emphasized the unions as the controlling factor. But now the offer of forty organized labor bodies to join the federation opens up a prospect such as the wiser heads on both sides have long hoped for.

Corliss Centennial Engine

National Engineer, May, 1901, p. 1.

The double-beam Corliss engine which furnished the power for the Machinery Hall at the Centennial Exhibition of 1876 in the city of Philadelphia, was when first seen, regarded by many, as a sort of "white elephant" on the builder's hands, and which served a useful purpose only as long as the exhibition lasted. The Centennial Corliss was taken back to Providence, R. I., after the exhibition was over, and in 1880 was bought by Mr. Geo. M. Pullman. It required a train of thirty-five cars to carry it to the town of Pullman. The engine has been running successfully ever since, working from ten to twenty-four hours daily. The engine is simple condensing, it has two cylinders 40 inches in diameter, with 10 feet stroke. The steam pipe is 18 inches in diameter, the ordinary pressure is 32 lbs. The piston rods are 6 1-4 inches in diameter. The walking beams are of the web pattern, 25 feet in length and 9 feet in width at the centre and weigh eleven tons each.

The valve gear is, of course, the well known Corliss gear and cut-off adapted to a verticle engine. The large gear fly-wheel is 29 7-10 feet, width of face 24 inches, pitch of gear 5 1-8 inches and it has 216 teeth. This wheel is built up in 12 segments, and weighs in all 56 tons. The wheel makes 36 revolutions per minute, and at the Centennial it revolved 2,355,300 times. It was at the time the largest geared wheel in the world, but it has been duplicated for a New England engine, and a heavier wheel is now in use at the Calumet and Hecla copper mine, Lake Superior. The largest geared wheel now in the world is the one recently made in Cleveland and shipped for use in the Kimberley diamond mines in South Africa.

[We remember hearing at the Centennial an explanation given of why Mr. Corliss had been compelled to cast the gear fly wheel in 12 segments. It was, that as the engine had been built at Providence, the whole state of Rhode Island was not large enough to admit of its being cast all in one piece!—Eds. Railroad Digest.]

English and American Train Service

Transport (London), May 10, 1901, p. 379.

Transport gives a number of figures showing the relative speeds of some of the principal express train services in United States and Great Britain. An "express" was taken to be a train not stopping oftener than once in 10 miles. It has been the writer's aim to obtain services typical of the best that is being done on both sides of the Atlantic. The English figures have been taken from the various companies official time-tables, and in the case of the American railways from the "Official Guide." The month of August, 1900, has been selected. The speed taken has been inclusive of stops, start to finish.

The writer claims that to those who are anxious to attack or defend the railways of Great Britain, the above figures must come as a disappointment, and his excuse in putting them forward is that they are at least more substantial than the hearsay evidence with which the public is too often regaled.

[The figures given here are accurately reproduced from Transport. It will be noticed that, in some cases, the figures at the bottom of the column marked "number of trains," is not the sum of the figures in that column, but no allusion is made to the apparent descrepancy.—EDS. RAILROAD DIGEST.]

SHORT DISTANCE SERVICES (UP TO 100 MILES), GREAT BRITAIN.

Towns Served and Route.	Distance. (Miles.)	Number of Trains.	Speed. (Miles Hour.)
Manchester and Liverpool, L. & Y.	36.5	29	47.5
Manchester and Liverpool, C. L. C.	34.25	33	46.2
Manchester and Liverpool, L & N. W.	31.5	36	45.0
All routes		98	46.1
York and Newcastle,* N. E.	80.6	38	43.1
London and Cambridge, Gt. East	55.75	23	40.7
London and Cambridge, Gt. Northern	58.0	13	43.0
All routes		36	41.5
London and Oxford,† G. W.	63.5	21	41.5
Glasgow and Ardrossan, G. & S. W.	31.25	9	41.6
Glasgow and Ardrossan, Caledonian	29.7	6	39.6
All routes		15	40.8
York and Scarborough, N. E.	42.0	32	40.6
Manchester and Southport, L. & Y.	35.0	18	39.8
Manchester & Southport, Cheshire Lines.	49.75	2	47.8
All routes		20	40.6
London and Brighton, L. B. & S. C.	50.5	25	38.2
Bristol and Birmingham, Midland	88.75	15	38.9
Bristol and Birmingham, Midland (Worc.)	91.35	7	32.0
All routes		22	36.7

*Includes London and Edinburgh "East Coast" trains
†Includes London and Birmington (G. W. R.) trains.

MEDIUM DISTANCE SERVICES (100-250 MILES), GREAT BRITAIN.

London and Leeds, G. N.	185.6	16	43.9
London and Leeds, Midland	204.5	19	43.3
All routes		35	43.6
London and Manchester, G. N.	209.3	10	43.9
Londo nand Manchester, Midland	191.25	18	42.5
London and Manchester, Gt. Central	206.0	16	41.2
London and Manchester, L. N. W.	189.0	17	41.0
All routes		61	42.0
London and Exeter, G. W.	194.0	23	41.9
London and Exeter, L. & S. W.	171.8	15	41.3
All routes		38	41.7
London and Birmingham, L. & N. W.	112.75	20	41.5
London and Birmingham, G. W.	129.32	20	40.6
All routes		40	41.1
London and Liverpool, Midland	220.25	13	40.6
London and Liverpool, L. & N. W.	193.25	18	40.5
All routes		31	40.5
London & Cromer, G. E.	139.0	10	39.9
London and Cromer, Mid. & G. N. J't.	159.0	4	39.1
All routes		14	39.7
London and Bournemouth, L. & S. W. R.	108.0	14	39.5
Liverpool and Hull, L. & N. W.	125.75	6	37.0
Liverpool and Hull, Great Central	134.5	5	34.0
All routes		11	35.6

LONG DISTANCE SERVICES (OVER 250 MILES), GREAT BRITAIN.

London and Glasgow, Midland	423.5	6	45.4
London and Glasgow, West Coast	401.0	15	42.7
London and Glosgow, East Coast	440.5	10	44.0
All routes		31	43.6
London and Holyhead, L. & N. W.	263.5	11	43.6
London and Edinburgh, East Coast	393.2	21	43.4
London and Edinburgh, West Coast	399.5	14	43.0
London and Edinburgh, Midland	406.25	6	42.1
All routes		41	43.1

SHORT DISTANCE SERVICES (UP TO 100 MILES), UNITED STATES.

Camden and Atlantic City, Penn. R. R.	59.0	20	54.2
Phila. and Atlantic City, Penn. R. R.	69.6	8	50.9
Camden & Atlantic City, Phila. & Read.	55.5	28	51.2
All routes		56	52.2
New York (J'y City) and Phila., P. & R.	90.4	23	44.5
New York (J'y City) and Phila., P. R. R.	89.8	48	43.1
All routes		71	43.6
Boston & Providence,* N. Y., N. H. & H.	44.8	20	40.1
Chicago and Milwaukee, C. M. & S. P.	85.0	15	40.8
Chicago and Milwaukee, C. & N. W.	85.0	13	39.2
All Routes		28	40.1
Weehawken and Kingston, W. S.	88.2	13	38.1
Boston and Concord, B. & M.	74.0	18	35.2
Chicago and Joliet, A. T. & S. Fe†	41.0	6	37.3
Chicago and Joliet, Chic., R. I. & P.	40.0	9	33.8
Chicago and Joliet, Chic. & Alton	37.2	9	33.3
All routes		24	34.5
San Francisco and Sacramento, S. P.	90.0	9	26.2

* Includes New York and Boston trains.
†Same trains included in Chicago-Galesburg service.

MEDIUM DISTANCE SERVICES (100-250 MILES), UNITED STATES.

New York (J. C.) and Wash., P. & R.	227.1	19	42.3
New York (J. C.) and Wash., P. R. R.	229.0	25	40.4
All routes		44	41.2
New York & Albany,* N. Y. Central	143.0	30	39.1
New York & Boston, N. Y., N. H. & H.	232.2	26	38.1
Chicago and Galesburg, C. B. & Q.	163.0	9	39.1
Chicago & Galesburg, A. T. & S. Fe.	182.0	6	35.5
All routes		15	37.7
Boston & Portland, B. & M.	115.0	11	36.5
New York & Troy, N. Y. Central	148 0	8	36.2
New York (J. C.) and Wilkesbarre,* L. V.	175.0	11	36.0

*Includes New York and Buffalo trains.

LONG DISTANCE SERVICES (OVER 250 MILES), UNITED STATES.

New York and Buffalo, L. V.*	446.6	7	40.0
New York and Buffalo, N. Y. Central	440.0	21	38.7
New York and Buffalo, West Shore†	428 0	7	36.4
New York and Buffalo, D. L. & W.(a)	409.0	9	36.2
New York and Buffalo, Erie,*	422.0	6	36 2
All routes		50	37.8
New York and Pittsburg,* P. R. R.	444.0	16	37.2
Chicago and Detroit, Mich. Central	284.3	6	36.0
Chicago and Detroit, Wabash	272.0	5	
All routes		11	35.8
Chicago and Cincin., C., C., C. & St. L.	325.6	6	35.0
Chicago and Cincin., Cin., H. & Dayton.	307.9	8	33.5
Chicago and Cincin., Pennsylvania	299.0	4	31.5
All routes		18	33.6
Chicago and St. Louis, C. & A.	283.6	5	34.9
Chicago and St. Louis, Illinois Central	293.0	4	32.9
Chicago and St. Louis, Wabash	286.0	6	32.3
All routes		15	33.3

*New Jersey (Jersey City).
†New York (Weehawken).
(a) New York (Hoboken).

Bavarian Train Runs Away

A curious accident occurred recently at Ludwigshafen station, Bavaria, to the Strasburg express, by which several persons were injured. Owing to the air-brakes failing to work, the train dashed through the station wall, crossed a street thirty yards wide, ploughed through a freight train on the harbor siding and went over an embankment into the harbor.

A certain railroad, in advertising the advantages which it claimed for its route, approached the public with something like the following: "Be sure you travel on the *A B* Railway. C. C. C.—Comfort! Civility! Celerity! Its rival at once appealed to the public through the columns of the daily press by saying: "All sensible people travel by the *X Y* Railway. H. H. H.—Ha! Ha!! Ha!!!"

The Canadian Locomotive Works, Kingston, Canada, are busy with orders for 20 consolidations for the Intercolonial Railway, two narrow gauge, 8-wheel passenger engines, for the P. E. I. Ry. and five 10-wheel freight for the Great Northern of Canada.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

M. C. & L. P. A. Portrait Gallery

ALEXANDER CAMPBELL.

A portrait of another veteran car painter graces our columns this month.

Mr. Campbell was born in Marine City, Mich., in January, 1841, and entered the service of J. Sheriff & Co., carriage bulider s, in 1857, where he served apprenticeship at coach painting, and afterward was appointed foreman painter of their shops. He removed to Bay City, Mich., in 1864, and engaged in the business of carriage and house painting until 1872. He removed to Detroit, Mich., in 1873 and entered the service of the Pullman Company, and was sent to England in 1874 by that company as foreman, and remained there until they closed their shop in 1877. He removed to New York City in 1878 to take charge of the painting of cars and engines of the Metropolitan Elevated Railway Company, and was, in 1879, appointed foreman painter of cars and engines of the Manhattan Elevated Railway Company, where he still remains.

Mr. Campbell became a member of our Association in 1880, and, though usually quiet and reserved, has served in various capacities, being chairman of Committee of Arrangements for the Convention at the Park Avenue Hotel, in New York, in 1896.

With its 324 locomotives, 1,117 passenger and 37 miscellaneous cars, on 36 miles of track, we can venture the assertion without fear of contradiction that the Manhattan "L" road is more densely covered with equipment than any other steam railroad in the world.

ALEXANDER CAMPBELL

Hotel Arrangements, Buffalo Convention

The following official notice has been received from the Secretary since preparing an article on the subject from information given us in reply to a letter to Mr. Vail, of the committee:

Hotel arrangements at Buffalo for the week of the convention have been completed, and the chairman of the committee states that the Columbia Hotel has been chosen as the official headquarters. The rates are from $1 to $2.50 per day for rooms for each person, and a convention hall in which to hold our meetings free, as well as committee rooms adjoining. This hotel is on the European plan, and the committee feels satisfied that we will have a pleasant place to hold the convention.

Rooms should be secured as early as possible, stating what rates you desire to pay. There is ample accommodation for all, and if you are intending to be at the convention, make application early.

ROBERT MCKEON, Secretary.

P. S.—I would add that there is a cafe connected with the hotel where meals are served at reasonable prices. There are also restaurants within a few doors, so I do not think the expense will be any more than on the American plan, and not as high, except for best rooms.

R. McK.

In a letter, date of May 16, Mr. D. B. Vail says:

"Yours just received, and in reply will say I notified my committee some time ago, and received letters from Messrs. Maycock and Taylor, saying they had both been trough the Columbia Hotel when they were here last, and thought we could not do better than to make arrangements with them.

"Mr. Butts, Mr. Lyons and I met at the hotel last evening, and, after looking through the rooms, etc., decided to have them reserve the second week in September for us. They have already booked quite a number of conventions.

"The rates are from $1 to $2.50 per person for rooms. They have a convention hall that will seat 180 or 200 persons, also a committee room adjoining, for which there will be no charge. They will serve meals in their cafe at reasonable rates, or you can find good restaurants near by. I, as well as others with whom I have talked, believe the European plan will be preferable to the American *at this time*. The Columbia is a very substantial building, and I am sure after you have seen it you will agree with me that the change was for the best."

Mr. Vail has kindly asked the hotel people to mail their descriptive booklet to all our members.

In a note received May 23 Mr. Vail further says that the hotel people inform him that a number of supply men have already engaged rooms, and he has had requests. Probably it would be well for all who contemplate attending our next convention and "the Pan-American show" to make reservations of rooms immediately.

Our Coming Convention

Since it has been determined by a mail ballot to adhere to the choice of the last Convention to go to Buffalo with our next meeting, we trust that strong determination to attend strictly upon the business sessions, notwithstanding that there will be fascinating allurements in the Exposition close at hand. As we shall be there four days, with daily forenoon sessions, there will be ample time each afternoon and evening to see the great show. No doubt there will be much to see in the great exposition that will be of an educational benefit in a practical way to us all, and that is one reason why we should hold our convention there; but this is not sufficient reason alone. Yet there will be time to see it all out of our sessions, as that will likely form the main feature of our entertainment, if not the sole one. When last there as a convention, in '94, we had a carriage drive out to the park and zoo, also an excursion to Niagara Falls, but these can be omitted this year, unless, after "first sight," the ladies are not smitten with the show and time hangs wearily. In this latter event an excursion to that natural wonder—the Falls—of which we never tire, will be in order. But, above all, come to the convention, and come determined to do your duty first to the company employing you; and take hold of the work heartily when you get there. Be prompt upon the sittings of the convention. Be punctual. Uphold your president; and from experience I know that nothing will gladden his heart like seeing the members come into the convention hall in troops on time. Let every modest, bashful member (like Gohen, Quest, Ball, etc.?) get into practice somewhere and rub the newness of the thing off, and come expecting and eager to be heard on the subjects before them. How it would gladden the old hands who generally have to do all the talking!

The Foreman Car Painter of To-day

The foreman painter of to-day is a vastly different factor in the paint shop problem than he was in the old days, either from a progressiveness of his own or the force of circumstances that have made him such, or both combined. Formerly he was esteemed for his artistic tastes—his prolific propensity to ever evolve new kinks in ornaments and startling shapes and shades of letters, or he was revered for his profound knowledge of pigments and the liquids used in their mixture or for their protection. In fact, he was a sort of combination of artist, painter and paint and varnish maker. He was a factor and a factory. He was an alchemist from whose dark domain went forth those mysterious potations that no man under heaven knew the nature of except himself, and no questions dare be asked about them either, for they would not have been answered if they were. He was the embodiment of mystery, the incarnation of art. He was deemed indispensable for these things alone. He was reverently feared—often adored and boasted about by the village small boy, not to mention his doting superior officers—if his character was unimpeachable; if not, it was condoned for what he knew of those things enshrouded in mystery to the uninitiated. In his boyhood his genius was fostered and encouraged, and alas! too often his schooling, of the most ordinary character, sadly neglected, which made him a good painter but a poor business man—wanting in those things that must come from his office to his superiors in pen and ink.

To-day all is changed. He is looked up to rather for his business qualities, his executive ability, together with a good experience as a practical painter. If he possesses those faculties that bring out of his shop a larger percentage of work of equal quality with a lower percentage of men in comparison with other shops, he is really the indispensable man of to-day, if anybody is to be considered such, for this is the kind of man wanted.

Circumstances over which he has had no control have largely shifted the responsibility for admirable and durable painting as formerly considered. The artistic has been superseded in great measure by the mechanical in decoration. Materials are now furnished from factory to shop, ready to apply, by men of equal honesty, knowledge and experience with him in the paint realm, and are tried and tested before sent out. Knowledge has so increased on every hand by open conventions and published proceedings, and by the printed page everywhere, that no man can claim the concentration of wisdom in his line of business.

The same is true as to house and carriage painting. The painter of a business turn is a success in these branches to-day rather than he who banks on his garnered knowledge of the supposedly mysterious. He must not wait for somebody to come and pray with him to get some work done; he will have to hustle and advertise to get it, and do it a little cheaper perhaps than some other fellow or than he did formerly, else the customer will go to the store and get the ready-prepared paint and do it himself, which latter is more than likely to be done.

Again, the railroad conductor of the olden days was of as much consequence as the Governor of the State. To-day there is more business in him than in a dozen of his former kind; in fact, there is so much writing and hustling connected with his position that it is doubtful if many of the old class could hold a job of this kind down to-day at all.

The chances for the foreman painter of to-day are just as good as they ever were to earn an honest dollar and make himself useful to his employers, but he must have different qualifications than he of the old school had, either acquired by experience and observation or by previous tuition. He must have a fair education, so that he can write a clear and intelligent letter or report to his superiors, from time to time, as required, concerning materials, methods and men; and to make out requisitions for tools and materials that will not be a laughing stock in the office and that can be read by those unacquainted with "Choctaw." He must be an excellent disciplinarian and be a good example of the conduct he wishes to enforce and see carried out in others in his employ. He must be pliable and willing to listen and learn from his superiors as to ways of doing work, and not think he knows it all and that they do not know a thing or two. Such a man is bound to succeed to-day when others fail who stand more zealous guard over their little knowledge than they do over their dispositions, passions and appetites.

The End of the Varnishing Season

This month ends the fiscal year and winds up the varnishing season on railroads and connections in the East. Our paint shop employes are "turned out to pasture," and we plod on until October with a greatly reduced force at what few jobs are on the stocks for heavy repairs, or rebuilding, or on what we happen to pick up. Instead of the "winter," it is the *summer* "of our discontent" the saddest of all the year. During this time we should put everything to rights for the fall and winter campaign—repair up or build new staging, get new planks and a plenty of them, so that John Jones wont have to travel a mile and a half to the other end of the shop to get one and have a fight with John Smith when he gets there over it because "he gets his hands on it first." By the way, get some planks that won't twist and roll over on the shop floor in seasoning, as most of our green spruce ones do, so that a man must walk in all positions on them when on the stage if he does not break his neck and "his heirs and assigns" sue the company for damages to his neck! How would cedar work for shop plank for stageing for lightness, cheapness and durability? Have any of our readers had any experience in this regard? This is a perplexity that pricks the painters' patience, if not a grave and reverend subject for discussion.

Then, again, this is a good time to make a good, clean, sharp, entire outfit of stencils for use in the ensuing year, throwing away those old antiquated relics that you have held so long that they have become filled up with paint around the edges and out of all resemblance to their former selves. In short, look over the appliances and put them in trim for future needs. If the stock room has got off neatness by slackness, bring it up and make any necessary additions to the place in general that you have thought of during the year past.

Interior Car Moldings and Head Linings

The days of the gilt molding on passenger car interiors are gone by. They are now supplanted by solid wood moldings of the same material as the interior finish of the car; and, when finished, impart a rich look to the work, and will last as long as the rest of the job.

Not so the gilt moldings. Never very good at best, of recent years they have been short-lived; and when worn they give to the interior a very "seedy" appearance, which was cheap enough looking when new. Unvarnished, gilt moldings would scarcely survive one annual cleaning of the smoky interior of the average car; and if varnished their beauty while new is somewhat marred. An Italian, who used to make the gilt moldings for the B. & M., thought he had made a great discovery when he found out that his moldings were varnished with the rest of the interior as soon as put up in the car! "I thought you did something to spoil those moldings." He had been complained to regarding their durability. How long would they have lasted without the varnish? As is well known, the gilt is nothing but silver or aluminum leaf with a wash of gamboge that turns it to a golden color. Of course the weather had some wear on them during the year, and when the car came in for the "annual washing" ten to one the soap brush of the car washer would start up the gamboge.

Gilt moldings have always been considered an accompaniment to cloth headlinings. When the wooden headlining came into vogue the gilt molding went by, so far as new cars were concerned, but there were many old cars with cloth linings. These are still being renewed on the B. & M. with new linings of a more tasty design, hand painted and decorated, and solid mahogany moldings are going up in place of the gilt, so that the interior appearance of the car is much better than when new a score of years ago, the interior finish having been divested of the old varnish and redressed throughout.

We remember the horror of the paint shop when wooden headlinings came along. "What a break-neck job it will be to scrape those when they come to it." As a matter of fact a wooden headlining is rather a long lived, economical affair. They will run after being put up new, with annual cleanings and occasional varnishings, a dozen years and look fairly well. Then they may be scraped easily with wide knives and a suitable varnish remover down to the wood; and if the wood is too dingy in its pores to again refinish in the natural state, take and paint the lining some tasty tint and decorate it with neat stencils and varnish it and it is good for another dozen years, when the operation can be repeated again, and so on, ad infinitum.

How the Major Beat the Train Robbers

"Speaking of train robberies," said a veteran railroad man to an after-dinner group in the St. Charles lobby the other evening, "did any of you fellows ever hear that story about Major Patterson? The yarn is not new," he continued, "and I thought some of you might have heard it before; but it happens to be strictly true, and is worth telling again. Years ago the Major was traveling on the railroad through Western Kansas when he fell into conversation with a very agreeable chap from St. Louis. Train robberies were frequent in those days and when the conversation finally turned to that subject the St. Louis man remarked that he had an excellent scheme for hiding his money in such an emergency. 'I simply put it under the sweat-band of my hat,' he said, 'and no robber in the world would ever think of looking there for cash.' With that he pulled off his hat and showed where he had $250 'planted' as he described.

"About an hour later the train was suddenly halted while it was turning a lonely ravine, and in a few moments a masked man entered the car and began to systematically loot the passengers, while two other robbers kept them covered with shotguns from the doors. When the fellow reached him the Major looked up coolly and declared he had less than a dollar in his pocket. 'Now, if you'll leave me that and my watch,' he said, 'I'll tell you something worth knowing: That fellow in the next seat has $250 under the sweat-band of his hat.' 'All right,' said the robber, 'keep your watch and chicken feed,' and he proceeded to confiscate the other passenger's cash. When the agony was all over and the marauders had departed the St. Louis man turned around, bursting with rage and indignation. 'That was a dirty, low-down trick!' he roared, 'and I'm going to hold you accountable for every cent of my money!' 'I expected you to, my friend,' replied the Major, quietly, 'and here is the amount. You see,' he added, 'I happen to be a paymaster in the United States army, and I have a matter of $40,000 in this valise by my feet. Under the circumstances I felt justified in temporarily sacrificing your little $250 to divert attention. I shall charge it up to the Government as 'extra expense in transportation of funds.' "—New Orleans Times-Democrat.

Management of Men

It is commonly supposed, says Friend Kelley, in "The Master Painter," that one must have an understanding of men in their various humors to successfully manage them, but some men have intuitive knowledge on the subject. They are born managers. The success attending the careers of great men has generally resulted from their ability, natural or acquired, to pick out the right assistants and get them to use their best efforts. Their methods are not always the same. Some men have to be driven and some led, with every possible shade of difference between the two processes. But the successful managers of men exhibit no characteristic in common. They have command of themselves and pursue their course, whatever it may be, with an even temper. When they drive they do so with moral force rather than with physical; when they lead it is with cheerful manner. They are always in earnest, and their purposes command respect. The driving man may be very quiet, though determined; it is his persistence without passion that breaks down opposition. If he should be arrogant, he would arouse resistance and perhaps fail in his purpose. The noisy, abusive, domineering ruler of men may command them through fear, but he has no real hold upon them, and the moment they are given an opportunity to escape from his tyranny they rebel. He is not a good manager of men, though for the time being they may obey him with alacrity. Successful management of men implies that they have been so trained by him that they will do their duty whether he is present or absent; whether he has the power to punish or reward, or is the mere agent of another and higher authority. Such a man rules by force of character, because the men under him have learned that he is fair-minded, sympathetic and devoted to duty. He is not arbitrary or bad tempered, but has obtained control over himself before undertaking to control others. He is, moreover, an observant man and quickly learns the dispositions of those whom he rules and treats them accordingly. With one he is indulgent, with another severe; with all he deals justly. Such men are, of course, rare, but these are the men who rise to the higher positions in business life; they are the men who are fitted to become foremen, managers and principals. Some of them are fitted for such by nature; all can qualify themselves for higher office by giving some attention to the qualities required of those who are to successfully manage other men. They must first of all learn to control themselves so that their tempers shall be even; they must be free from prejudice, able to deal justly with all men; they must have a definite purpose in life and sufficient determination to follow it unswervingly. Men thus constituted command respect, and are, therefore, fitted to rule or manage other and weaker characters. The common idea of a manager or boss is of an arrogant, loud-mouthed, cruel ruler who governs by the fear he inspires; but the real rulers of men are gentle and just, but persistent. They are men who control themselves and are thus fitted to control others.

"Officers and Gentlemen"

The work of the railroad man, especially in the passenger service, is a strain on the nerves. Trains are supposed to hurry over the road; passengers are generally in a hurry and very often confused, and the men in uniform are appealed to from all sides for information and assistance. The railroad management, operating on the progressive theory that more flies can be caught with molasses than with vinegar, expects them to be useful in helping passengers avoid mistakes and in making them comfortable. How to keep in good temper and still try to please everybody is an hourly problem with them. But they are solving it.

At the Watertown section a few days ago, as the train was ready to move out, the ticket agent called out to a trainman who had come into the waiting-room, evidently in search of somebody.

"She is sitting there in the corner. A lady who is with her is trying to have her baggage checked."

The trainman found a young woman, evidently an invalid, with a face distressingly anxious and inexpressibly sad, and, taking her arm, he led her toward the train, past the baggage room. They were met by the conductor and the lady friend, who had attended to the baggage, and then the women parted, the almost helpless traveler being committed to the care of the men who wore the uniform of the New York Central, a uniform which often represents as much of bravery and chivalry as the Red Cross does.

The two men led their charge to the steps of the car and lifted her into it, and guided her to a seat; she was blind.—Watertown (N. Y.) Daily Times.

Experience has taught those responsible for the maintenance of cars, interiors especiallly, to avoid everything frail and short-lived and build for permanence. If a man has not gotten over the idea that a car interior is not a house interior it is high time he should. It may cost his company something to give him this experience, but it must come sooner or later. He must learn that a house interior is "not in it" for smoke and dirt compared with a car interior; and he must build and finish his work accordingly. Once in a while, in the years gone by, you would come across a man in power who wanted a cloth headlining to resemble a house ceiling fresco; and so he would not have it varnished!

Open Letters to Members of the Master Car and Locomotive Painters Association

As the much-vexed question in regard to the place of our next meeting has been settled by a majority vote (I hope satisfactorily) it is my earnest hope that each member who has been assigned a subject will put his shoulder to the wheel and give us a first-class report and be prompt in furnishing the secretary with a copy of the same at least fifteen days before we convene. The subjects furnished you by the advisory committee are all live ones, and, if you all do your best (which I know you will) we will make this, our thirty-second annual convention, one of the best of our existence.

A. J. BRUNING,
President.

Evansville, Ind., June 1, 1901.

NOTES AND COMMENTS

Some Errata:

Some typographical errors crept into our May issue, but we will trust the good sense of our readers to correct most of them, possibly excepting the word "mar" after the words, "It will be found that varnish," etc., in first paragraph of article entitled, "The Care of Window Seats." The word wear should be substituted for the word "mar."

The "Sam" referred to in our "Notes and Comments" for May as present at our car-cleaning test as "being a witness of the performance," was "Sam" Brown, whose new cleaner we were trying. The typos left out a line.

Our Committee on Uniform Lettering of Freight Cars, Messrs. Miller, Butts and Gohen, might kill two birds with one stone by resolving themselves into a kind of an ex-officio committee of arrangements for our 1902 convention, and see what kind of a place Saratoga would be for us to hold a convention, and what they could do for hotel accommodations and terms, and report at our next convention. We make this as a suggestion for what it is worth. We have never held a convention there yet, though it has been voted on, and it has become almost a permanent place for the Master Car Builders and Master Mechanics.

Coe's Gilding Wheel is fast becoming "a globe-trotter." Great Britain, Germany, France, Russia, Sweden, Norway, Australia, New Zealand, South Africa and other countries are said to be rapidly adopting this method of gilding, which shows that the Coe Manufacturing Company, of Providence, R. I., are not "Hiding their light under a bushel," and that all things come to him who hustles while he waits.

The "lignomur" paper lining was "not so bad," after all. Glued to the wood underneath, it made a solid foundation and can be repainted as often as desired in a tasty fashion when it has become soiled with years of smoke and wear.

Messrs. B. E. Miller, H. M. Butts and J. A. Gohen are the Committee on Uniform Stenciling or Lettering of Freight Cars to attend the convention of the Master Car Builders at Saratoga. This is introducing them to you, gentlemen, if they need any introduction. Success to them and to you in devising some methods to get out of this labyrinth of all sizes of hieroglyphics (and portraits in colors) that do everything but adorn our "goods vans" on the rail, and are such a source of annoyance to us and expense to you.

We clip the following interesting item from a recent paper; but, great snakes! it will take something more than this to keep our women folks from attending our Buffalo convention, though the men are easily scared:

"Buffalo people are asked to be on the lookout for, and when found kindly return to its owners, a twenty-two foot boa constrictor which escaped from a wagon while on its way to the Pan-American Exposition. No curfew law is needed in that part of the town now to get the little folks to stay in the house after dark."

Mr. A. R. Johnston, who had for some time assisted the late Jacob Wegmer in the conduct of the railroad business of Clarence Brooks & Co., has succeeded to the position so long held by the deceased gentleman as the railroad representative of the firm. Mr. Johnston is an enterprising and energetic young man who will worthily fill the shoes of his able and respected predecessor.

Mr. D. L. Paulus resigned from the staff of Mr. B. E. Miller, M. P., D. L. & W. R. R., at the Scranton shops, April 1, to accept the position of general foreman painter with the Barney & Smith Car Company, Dayton, Ohio, succeeding Mr. Frank Taylor, resigned. He joined our association at Washington, D. C., September 9, 1891, being then with the Lamokin Car Company, Chester, Pa., since which time he has also been on the staff of Mr. J. D. Wright, general foreman painter, B. & O. R. R., at the Mt. Clare shops, Baltimore, Md. Mr. Paulus writes that he expects to be with us at our next convention. We wish him health and success in his new position.

For the benefit of any concerned, the writer will give his experience in maintaining the good appearance of the common sheet copper bath tub that is tin-plated inside and the tin of which has worn off, leaving a coppery look in spots that is uninviting. It is customary to paint these, under above conditions, with a white enamel made for the purpose, and this he had done twice, but this flaked off more or less each time, and, as he was scraping it off preparatory to enameling it the third time, the thought struck him, Why not bronze it with aluminum? And he did so, with good results. The process was to first varnish the cleaned metal with a coat of elastic car finishing varnish, and, when dry, to the requisite condition of "tackiness," rub on the fine, dry aluminum powder with a chamois pounce, and your old previously dingy tub will shine like a new Bryan 16 to 1 dollar. Then give it another coat of the same varnish over it to protect it, and, when thoroughly dry and hard, if it does not beat the old way of painting or enameling them, then, as one almost daily hears in Boston, we "don't know beans." In either case it is advisable not to let water run in too hot; let both hot and cold run together.

Our Vice-President, Mr. A. P. Dane, has recently lost his aged father in Washington, D. C. He had attained the remarkable age of ninety-four last March, and was wonderfully preserved in vitality, succumbing at last to an attack of pneumonia, which so frequently takes off the young as well as the old. He had the clearest mind at his age that the writer ever met, keeping abreast with all that was going on; and, with a keen relish for wit and humor, he was most enjoyable company. The local paper in Reading, Mass., of May 4 contained his portrait and a column and a half history of his eventful life. He drove stage over the routes now occupied by the oldest railroads in Massachusetts.

At a Liverpool street railway station recently, just as a train was about to go out, a boy ran up to the ticket collector and whispered:

"Sir, there's two men traveling first, and neither of them's got tickets."

Off went the inspector and searched all the first class carriages through, but without avail; all the passengers had proper tickets.

Seeing his informer standing near the entrance, he shouted:

"Where's the two men without tickets?"

"On the engine, of course!" shouted the boy, as he edged away.—Railway Herald.

It is a custom of the Boers to question travelers minutely for news. A commercial traveler gives the following of his last quarter's operations before the outbreak of the present hostilities:

"Traveled 3,964 miles, carried four trunks, showed goods 116 times, sold goods 96 times, been asked for news 5,061 times, told the news 2,210 times, lied about it 2,160 times, did not know 691 times, been asked to drink 1,861 times, drank 1,861 times, changed politics 46 times, been to church once."

A railway traveling inspector once boasted in a railway carriage that he had been mistaken for the Prince of Wales. A commercial traveler—a Scotsman—hearing this, replied that he had been addressed as the Duke of Argyll. Whereupon an Irish cattle dealer said he had been taken for a far greater person than either, for, as he was standing in St. Ives Market one day a friend came up to him, exclaiming:

"Holy Moses! is that you?"

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

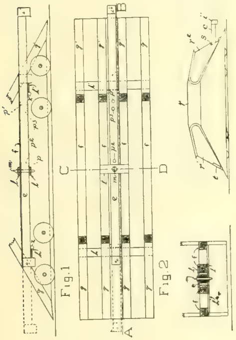
A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

Draft-Bar Construction for Rolling-Stock

No. 674,328.

WILLIAM E. WILDER, of Brookline, Mass.

The use of double-ended snow plows necessitates the employment of a buffer or push bar at both ends, and the construction of the prows or snow clearers is such that this buffer or coupling must project a considerable distance beyond their slanting faces. These faces when used for clearing snow would be considerably obstructed if the said coupling



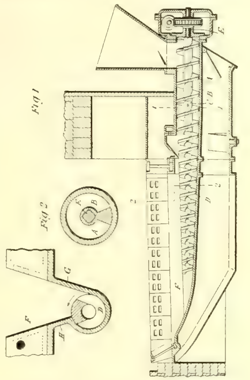
were allowed to remain projecting to its full extent or to any considerable extent. As applied to double-ended snow plows my invention overcomes this difficulty by the provision of an elongated draft bar which is movable lengthwise of the plow, so that either of its ends can project beyond the end of the plow and be utilized as a push beam, while the opposite end is retracted within the plow and the aperture in that end of the plow closed over, so as to provide a smooth and unobstructed prow or snow clearer.

Mechanical Stokes

No. 672,973.

WILFRED WOOD, of London, Eng., assignor to the American Stoker Company, of New York, N. Y.

The present invention relates to detail improvements in mechanical stoking apparatus—such, for example, as is described in my prior patent, No. 608,819, dated August 9, 1898. In said patent



the feed screw is shown as having a constantly decreasing taper and pitch from the outer to the inner end, and in stokers made in accordance with said patent it has been customary for the inner side walls of that portion of the coking or fuel chamber in which the screw rotates to leave or break contact with the screw at a plane drawn approximately through the axis thereof. By experiment I have found that the radial or upward feed of the fuel takes place almost entirely on that side of the screw on which the thread rises, such feed being almost tangential, and that on the descending side the fuel at times tends to cake or accumulate and is fed forward without rising substantially, and as the pitch and taper of the screw decrease the fuel experiences a constantly increasing difficulty in radial or upward movement, any tendency to which is partially impeded from the bottom by the boss or stem of the screw, and at times so much power is required to drive the screw that it is sufficient to break the same against the caked material.

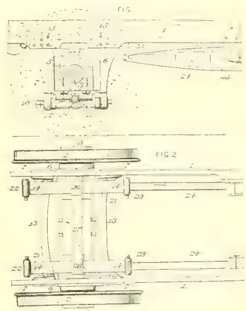
According to the present invention it is proposed that the coking or fuel chamber of the magazine should only be open to a radial or upward feed from a point approximately on a horizontal plane with the axis of the screw on that side upon which the thread rises to a point at or slightly past that which would be formed by a plane vertically drawn through the axis and that the screw itself or the portion thereof within the coking chamber should be a helix or spiral without a core or stem and having a gradually decreased carrying capacity.

Radial Truck

No. 673,727.

JOHN PLAYER, of Dunkirk, N. Y., assignor to the Brooks Locomotive Works.

The invention relates to so called "radial trucks" for locomotive engines and other railroad rolling stock in which lateral motion or radial movement of a bearing axle of the vehicle relatively to the main frame thereof is provided for to facilitate and reduce strains in the passage of the vehicle into, through, and from curved portions of the track.



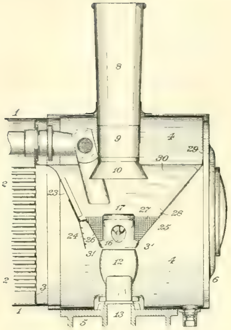
The object of my invention is to provide effective and desirable means whereby an increased range of lateral movement in the axle may be permitted, the construction of the axle box guides and their connection to the main frame simplified and cheapened, and improved facilities provided for transmitting the weight carried by the springs to the radial axle and equalizing it with that borne by the adjacent driving axle.

Locomotive Draft Appliance

No. 673,726.

JOHN PLAYER, of Dunkirk, N. Y., assignor to the Brooks Locomotive Works.

The leading and essential feature of the invention consists in the combination, with a smoke-box, of an exhaust pipe having an annular nozzle of large area for the escape of the exhaust steam and provided with an internal passage for the entrainment of a portion of the gases of combustion of sufficient area to enable the entrained gases to partially destroy the vacuum created in the interior of the annular column of escaping steam, said gases being admitted through openings located above a spark arrester, so that the effective point for the creation of vacuum may be properly centralized in the smoke box. The intensity of the vacuum is thereby augmented with a materially lower velocity of the escaping steam, and an increase in the discharge area of the exhaust nozzle of from thirty to fifty per cent. has been found to be satisfactorily attainable in actual practice.



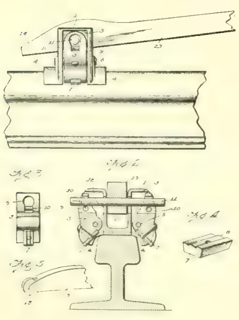
The improvement, while herein shown as more particularly designed for application in locomotive boilers, is equally adaptable to use in any other type of boiler in which the exhaust steam is employed to maintain the draft upon the fire. It has been applied with entirely satisfactory results as to free steaming and economy upon several different railroads, and the material reduction of back pressure due to its use will be manifest from the fact that in the instances referred to the exhaust steam discharge area of the nozzle has been made forty per cent. or more in excess of that used in exhaust pipes of the ordinary construction.

Pinch-Bar

No. 674,898.

JACOB L. BOVEE, of Richford, N. Y.

This invention relates to new and useful improvements in pinch-bars, especially adapted for moving cars from place to place and its primary object is to provide a device of simple construction which is adapted to be placed upon a rail and which is provided with jaws adapted to firmly clamp the rail when pressure is placed upon the device.



A further object is to so construct the device that the jaws will swing out of engagement with the rail automatically when the bar is raised.

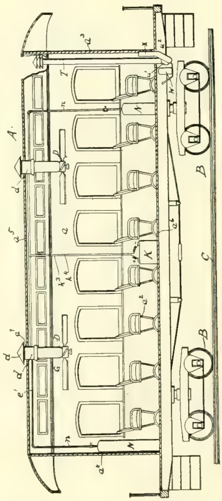
With these and other objects in view the invention consists in providing a casting within opposite sides of which are pivoted jaws which extend to points below the bottom of the casting and are adapted to lie upon opposite sides of the rail. A pin is loosely mounted within the upper ends of the jaws and is adapted to bear thereon at points outside of vertical alignment with the fulcrums of the jaws, and the operating lever is pivoted upon this pin at the center thereof. Blocks are secured to each of the jaws and are adapted to bear upon the rails and securely grip the same.

Ventilating Apparatus for Cars

No. 674,705.

THOMAS H. MASTIN, of Kansas City.

In a ventilating apparatus a case, a motor within said case and its shaft, an air suction and forcing fan upon said shaft, a ventiduct or tube connected with said case, and an outwardly extended annular, recessed portion of said tube concentric with the outer side of said venti-



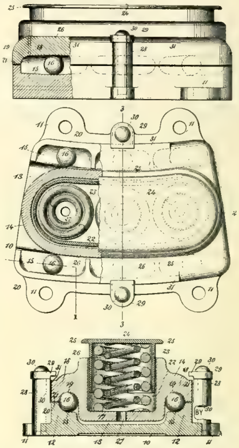
duct, having its annular, upper end extended outwardly and within the said annular, recessed portion of said ventiduct, and a receptacle for air connected with the lower end of said rotating tube, having air induction openings, a motor in said receptacle, and hollow, air agitating fan blades having one end extending within the said induction openings in said rotating receptacle.

Side Bearing for Railway Cars

No. 673,998.

EDWARD CLIFF, of Newark, N. J.

The object of the invention is to produce a more efficient side bearing than any heretofore known to me, and one especially capable of obviating the known difficulties incident to hauling cars around curves, especially short and tan-



gent curves, and permitting the ready straightening out of the cars into alignment with the trucks after the cars have passed around such curves.

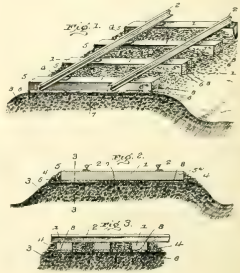
The side bearings made the subject hereof are particularly applicable to swiveling car trucks and are applied in the ordinary manner intermediate the outer ends of the truck bolster and body bolster.

Railroad-Track

No. 674,370.

WILLIAM GOLDIE, of Wilkinsburg, Penn.

While improvements have been made in the weights of rails and rail connec-



tions, these have been found insufficient to withstand the heavy strains incident to increased weight in the rolling stock and increased speed of the trains, and some means of obtaining a more permanent solid track and more permanent surfacing thereof without affecting the solid bed formed under the ties and a more perfect support for the track, requiring little or no resurfacing, has been considered desirable and has not yet been obtained. The present invention is believed to supply this need.

The invention is claimed as follows:

1. A railroad track composed of a ballast bed, ties and rails, and having cement supporting beds interposed between the ties and the ballast beds and extending from the ends toward but not to the centers of the ties.

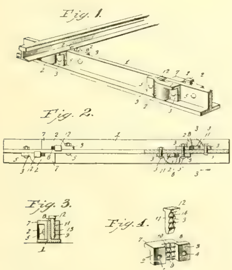
2. A railroad track composed of a ballast bed, ties and rails, and having cement beds interposed between the ballast beds and the ties, and extending from the ends toward but not to the centers of the ties, and drainage channels extending through such cement beds.

Railroad-Tie

No. 675,003.

GEORGE W. ELTZROTH, of Marion, Ind.

This invention relates to railroad ties, and has for its object to provide an improved cross tie and track fastening combined in which a comparatively narrow tie has broad rail chairs and the fastenings are arranged for convenient application and removal, so as to facilitate the laying of a track and the replacing of rail sections, and also to arrange for adjusting the fastenings to accommodate the tie to rails having different widths of base flanges.



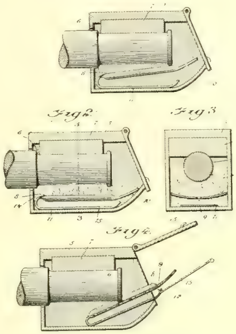
The combination of a cross tie, rail chair sections secured to opposite sides of the tie, with their inner ends overlapped to form a broad seat, a common fastening piercing the overlapped inner ends of the chair sections, and track fastenings carried by the respective chair sections and spaced to receive a rail therebetween.

Journal-Oiler

No. 675,240.

FRED E. PARSONS, of Marshall, Minn.

A journal oiler, comprising a transversely curved plate extended across the journal box underneath the journal and having its outer end extended beyond the end of the journal, a spring plate extended from the inner end of the first



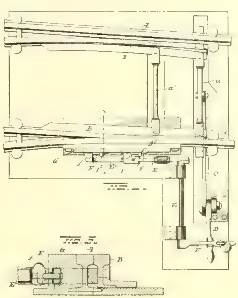
named plate and underneath the same, the free end thereof being turned upward free from the bottom of the journal box, and provided with an opening to receive a hook or the like, and a packing arranged between the first named plate and the journal.

Locking Mechanism for Switches

No. 673,673.

CHARLES H. ANDRUS, of Reading, Penn.

The invention relates to an improvement in railroad switches, the object of the invention being to provide means for



absolutely preventing any movement or separation of the point rail from the main rail when the switch is set for the main line, and also, if desired, for similarly locking the point rail when the switch is set for the siding.

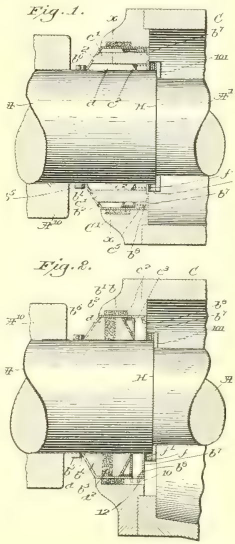
In a switch, the combination with fixed rails and point rails, the latter being connected so as to move together, of means for moving said point rails, means carried by said rails and co-operating with one of the point rails to lock it immovably in position against a fixed rail, and means co-operating with the moving means and the locking means to lock them both positively against operation.

Dust-Guard

No. 674,635.

JULIUS A. PERKINS, of Omaha, Neb., assignor to Moffett Bearing Company, of Council Bluffs, Ia.

A rotating shaft, a dust guard case containing packing, a box having an end surrounding said dust guard case, means to restrain the rotation of said case in said box end yet permit the sliding of



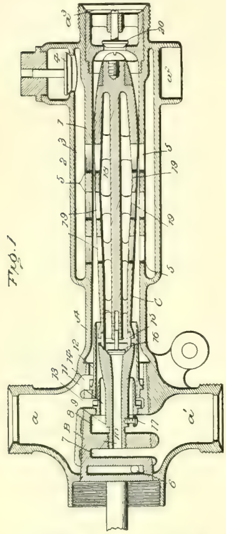
said case in said box end in the direction of the longitudinal axis of the shaft, and a packing interposed between the exterior of the dust guard case and the interior of the box end to prevent dust entering the box between the outer side of the case and the opening in which it slides in the box end.

Steam-Injector

No. 674,184.

FRANCIS STICKER, of New York, N. Y.

This invention relates to steam injectors; and the contemplated improvements are applicable in the main to injectors operated by live steam alone or exhaust steam with or without the addition of live steam.

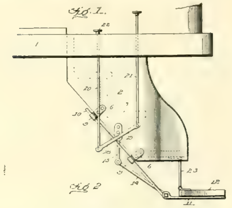


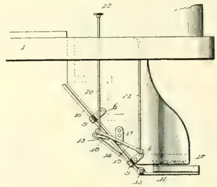
One object of the invention is, primarily, to provide means which will enable a machine to perform a large variety of work under different conditions. By my present improvements I am enabled to so equip various styles or types of injectors that good results may be obtained under every different state or condition of steam and different quantity and quality of water, or vice versa, means being provided for regulating the steam as well as the water to suit existing conditions. To these ends I employ a cock formed with a series of separate chambers, and into the partitions are screwed jets or tubes, one or more of which are stationary and one or more movable or adjustable longitudinally, whereby the capacity of the machine may be regulated by directly or indirectly controlling the water.

Railway-Car Step

No. 674,033.

JOHN A. KRATZ, of Baltimore, Md.





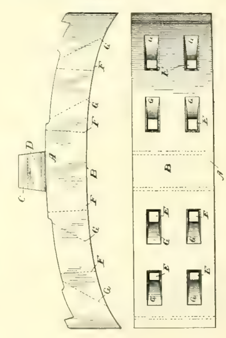
The combination with a railway car platform; of a supplemental extension step adapted to be raised to a position below the lower stationary step of the platform; guide rods secured to said supplemental step; longitudinally adjustable bars provided with keepers for said guide rods, and means for raising and lowering the supplemental step comprising a rock shaft, crank arms projecting therefrom and connected to the supplemental step; a crank at one end of said shaft, and means for rocking said shaft.

Brake-Shoe

No. 674,679.

GEORGE H. GILMAN and JAMES H. BROWN, of Tacoma, Wash.

The object of the invention is the production of a brake-shoe which shall be as light as possible in weight, shall prevent the locking and consequent sliding of the wheels caused by foreign substances getting between the shoe and the wheel, shall be provided with means for keeping the shoe cool during the application of the brake, shall increase the value of the worn out shoes by reason of the absence of steel or wrought-iron plugs used in some makes, shall be so constructed as to be strongest at the center, where the greatest strength is required, and therefore least liable to break



in service, shall present soft portions for contact with the flange of the wheel, and hard portions for contact with the tread, and shall be so constructed as to prevent too rapid wear of the shoe.

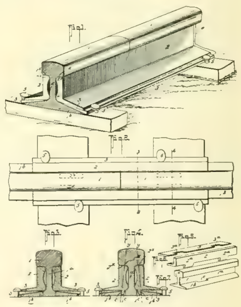
A brake-shoe composed of ordinary soft, cast metal and provided with apertures extending through from the face to the rear, the walls only of said apertures being hardened or chilled during the process of casting the shoe, the rest of the entire shoe being composed of ordinary soft cast metal.

Rail Joint

No. 673,811.

ADDISON BARR, of Martins Ferry, Ohio.

This invention relates to improvements in that type of rail joints in which the rail sections are connected by tie or fish plates having members adapted to interlock with the rail sections; and my said invention seeks to provide a rail joint of the character stated of a very simple, economical and stable construction in which the several parts can be readily assembled and which will effectively serve to keep the rail sections joined without the use of bolt and nut lock devices such as are commonly employed.



The invention in its complete make-up also includes a novel combined wedge and lock member for holding the fish plates from longitudinal displacement and also to cause them to bear closely up against the under face of the tread or head portions of the rail in such manner as to resist the downward strain on the rail and disseminate said strain over a greater base surface than ordinarily and to provide a firm bearing for the rail and maintain a rigid joining of the rail ends, whereby to reduce the rail vibration and rattling to the minimum.

NOT A "STANDARD STEEL PLATFORM."

"I understand that a stump orator's private car is to be attached to this train."

"Don't worry, sir. You will not be disturbed. We have arranged to remove the rear platform just as soon as the train starts."—Cleveland Plain Dealer.

PERSONALITIES

L. F. Loree, fourth vice-president of the Pennsylvania lines west of Pittsburg has been selected to succeed Mr. John K. Cowen as president of the Baltimore & Ohio, with headquarters at Baltimore. Mr. Loree has been general manager of the Pennsylvania lines west since January 1896, and was made fourth vice-president in January of this year.

Reuben Wells, formerly superintendent of the Rogers Locomotive Works, has accepted a position with the Great Northern Railway as consulting locomotive expert.

J. H. McConnell, fromerly superintendent of motive power of the Union Pacific, sailed on May 16th, with Mrs. McConnell, for a visit to Europe of some months' duration.

R. B. Campbell, formerly general manager of the Baltimore & Ohio, and more recently general manager of the Washburn, Bayfield & Iron River, has been appointed general manager of the Elgin, Joliet & Eastern and Chicago Lake Shore & Eastern with headquarters at Joliet, Ill.

S. R. Callaway has resigned as president of the New York Central & Hudson River R. R. to accept the position of president of the American Locomotive Company, which has been formed by a consolidation of the Cooke Locomotive Works, the Brooks Locomotive Works, the Manchester Locomotive Works, the Pittsburg Locomotive Works, The Rhode Island Locomotive Works, the Schenectady Works, and the Richmond Locomotive Works. The president's headquarters will be in New York, where the principal office will be located.

G. R. Henderson has resigned as assistant superintendent of motive power and machinery of the Chicago & Northwestern, to take effect on June 1, to accept the position of assistant superintendent of machinery of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan., succeeding Mr. R. P. C. Sanderson, resigned. Mr. Henderson was formerly mechanical engineer of the Norfolk & Western, was afterward with the Schenectady Locomotive Works, and has been assistant superintendent of motive power and machinery of the Chicago & Northwestern since July, 1899.

J. H. McConnell, late chief of the mechanical department of the Union Pacific, was recently presented by the employes formerly under his charge, with an order for a gold watch, to cost not less than $1,000, to be selected by himself.

S. P. Bush has resigned as superintendent of motive power of the Chicago, Milwaukee & St. Paul, to take the position of general manager of the Buckeye Malleable Iron & Coupler Co., of Columbus, O. Mr. Bush has held his present position since January 1, 1900, and was formerly superintendent of motive power of the Pittsburg, Cincinnatti, Chicago & St. Louis at Columbus.

R. L. Brown has recently taken the position of sales agent of the Universal Car Bearing Co., at 1240 Old Colony Building Chicago. He has been with the Kindl Car Truck Co., for some time as one of their representatives.

J. C. Halladay has resigned from the Chicago Pneumatic Tool Company to take the position of general western salesagent for the Protectus Company, of Philadelphia, Pa., with offices at 532, The Rookery, Chicago.

F. W. Snow, formerly representing Valentine & Co., has taken the eastern agency of the Spiral Journal Bearing, for the St. Louis Car Company, and will be located at 1314 Havemeyer Building, New York.

R. P. C. Sanderson has resigned as assistant superintendent of machinery of the Atchison, Topeka & Santa Fe. Mr. Sanderson was formerly with the Norfolk & Western for many years as division superintendent of motive power and later as master mechanic of the eastern division, and went to the A. T. & S. F. on February 1, 1900. During the absence of Mr. John Player for some months, Mr. Sanderson has been acting superintendent of machinery.

William Forsyth has been offered an appointment at Purdue University as Associate Professor in charge of locomotive and car designs. It is reported that Mr. Forsyth has accepted the appointment.

J. C. Wilkinson, late of the Great Northern Railroad, at St. Paul, Minn., has recently been appointed general foreman of the machine tool shops of the Central Railroad of New Jersey at Elizabethport.

Joseph Gassner, foreman in the erecting shop of the Central Railroad of New Jersey at Elizabethport, has been appointed general foreman of the same shop.

Angus Brown has been appointed division superintendent motive power for the Middle and Hudson divisions of the New York Central Railroad, with headquarters at West Albany. He will have jurisdiction over locomotive department business on the Middle and Hudson divisions and over car department business on the Middle division.

H. E. Gilpin, who had formerly held the position of superintendent of the New York terminal of the Erie Railroad, was appointed May 6 acting general superintendent, and on May 15 had this latter appointment confirmed as general superintendent of the terminal. He takes the place of the late Mr. Staples. Mr. Gilpin is succeeded as superintendent of the New York terminal by Mr. G. W. Dowe, formerly division freight agent at Hornelsville, N. Y.

G. E. Macklin has recently been made general manager of the Pressed Steel Car Company, Pittsburg, Pa. Mr. Macklin was formerly assistant general sales agent, with headquarters in New York City, vice Mr. H. G. Shellenberger, resigned.

OBITUARIES

Job H. Jackson, president and one of the founders of the Jackson & Sharp Company of Wilmington, Del., died at his home in that city on Thursday, May 23. Mr. Jackson was in his sixty-eighth year. He began life as a grocer's boy and held various positions with the Pennsylvania R. R., the Ohio & Pennsylvania Telegraph Company, and others until 1863, when, with Jacob F. Sharp, the Delaware Car Works were established. Mr. Jackson held various positions of trust in his city, and was director of the Artisans' Savings Bank, a trustee of Dickinson College, and president of the board of trustees of Grace M. E. Church.

James F. Goddard, commissioner of the Trunk Line Association, died in Brooklyn, N. Y., on May 13, at the age of fifty-nine years. He was born at Brockton, Mass., on January 28, 1842, entered railway service in April, 1868, as a clerk in the general freight office of the Chicago, Burlington & Quincy, and from January 1, 1872, to November, 1874 was assistant general freight agent of the same road. In November, 1874, he was appointed general freight agent of the Hamilton & St. Joseph, but in September, 1875, he returned to the C., B. & Q., as assistant general freight agent. He resigned in July, 1878, to accept the general freight agency of the Atchison, Topeka & Santa Fe, and in December, 1882, was appointed traffic manager of the latter. He was made assistant general manager in July, 1885, and general manager in May, 1887. He was chosen third-vice-president on May 10, 1888, and held that position as well as that of manager of the Chicago, Santa Fe & California, until June 1, 1890, when he resigned. He accepted the position of chairman of the Western Passenger Association at Chicago on June 10, 1890, but resigned on November 1 of the same year to become commissioner of the Trunk Line Association. From January 1, 1896 to 1899, he was also arbitrator of the Joint Traffic Association.

Frank Diebert, mechanical superintendent of the Baltimore & Ohio lines west of the Ohio River, died of pneumonia on May 25.

Woodcock Steel Cars

We have received a letter from Mr. W. H. Woodcock, formerly chief engineer of the Dutilh-Smith-McMillan Company, of Philadelphia, in which he says he has organized a company to build all classes of railroad freight car equipment. The name of the new concern is the Philadelphia Metal and Car Company, office at 605 Lippincott Building, Philadelphia.

Mr. Woodcock, refers to our resume of the article on the Woodcock Steel Hopper Car, page 189, Digest for May. The car is there said to be 36,980 lbs. light weight. Mr. Woodcock asks us to state that the total weight of his car, complete, is only 32,200 lbs.

The M. C. B. Rules of Interchange

Editors RAILROAD DIGEST:

I think it will be conceded that freight car interchange under present rules is working as smoothly as consistent with the conditions and with human nature, except in one particular, and that is in connection with improper repairs, which is a subject on which the Committee on Rules has always hesitated about laying down hard and fast rules.

The Arbitration Committee has rendered several decisions, but the question is like Banquo's ghost—"it will not down."

As a resume of past legislation may be helpful, as showing where "we are at" at present, I submit the following:

Decision in Case 341, May, 1896, made intermediate roads responsible for perpetuating improper repairs.

Decisions in Cases 394 and 395 made intermediate roads responsible for evident wrong repairs not covered by a repair or a defect card.

The convention of June, 1897, added a clause to Section 1 of Rule 3 by which a delivering road was relieved of responsibility for improper repairs not made by it.

The subject then lay dormant for two or three years, when the question came up again in Case 594, October, 1900, in which the decision intimates that the decisions in Cases 394 and 395 applied only to wrong repairs of *delivering road's defects*, for the committee ruled that all that could be required of delivering road for wrong repairs of *owner's defects* was a joint evidence card.

Therefore, as the matter now stands, according to Section 1 of Rule 3, a delivering road is not responsible for wrong repairs not made by it, but if the improper repairs are *delivering road's defects* then the delivering road is responsible, and it should have secured defect card when car was accepted.

If the improper repairs are *owner's defects*, then all that can be demanded of the delivering road is a joint evidence card.

This adjustment is more equitable to car owners than the way the matter is left by Rule 3, Section 1, and it is fairer to roads handling cars than as Case 394 placed it.

If second paragraph of Section 1, Rule 3, was made to read "Defect cards shall not be required of delivering roads for improper repairs of *owner's defects* not made by it, etc.," it would agree with the decision in Case 594; then add a section to Rule 4 authorizing any road finding a car with wrong material, broken, or which rendered car unsafe, to apply proper material and charge the car owner, except cases provided in Sections 24, 33, 35, 36 and 37, of Rule 3, it would be in harmony with the practice recommended by the Chicago and the Cleveland Car Foremen's Associations.

Of course, car owners would sometimes have to pay for correcting some wrong repairs which they themselves would not have corrected, but if the road making the repairs thought it necessary for safety to make the repairs there would be few occasions for objection. It would be impossible to make a rule to fit all cases, and the expense would be evened up in the long run.

Another subject in the handling of which the Arbitration Committee seems to be sailing between Scylla and Charybdis is the question of consequential damage.

The committee ruled in Cases 137, 138 and 217, in regard to broken axles, and in Case 544, in regard to broken truck bolster and further damage resulting; also in Case 593, covering broken spring plank by a coupler dropping upon it, that the further damage was consequential and car owners were not responsible for the further damage; the charge to car owners should be confined to the repairs of the part first failing.

In Cases 472, 581, 587 and 607, covering broken spring hangers and further damage resulting; also Case 528, coupler breaking and bruising air hose, it was decided that they were not cases of consequential damage and all the repairs were chargeable to owners.

To sum up: In case of broken axle or truck bolster and further damage resulting, it is consequential damage; in case of a broken spring hanger and further damage resulting, it is not consequential damage.

If a coupler drops upon and breaks a spring plank it is consequential damage.

If a coupler breaks and bruises an air hose it is not consequential damage.

There are good reasons given for some of the different decisions, and if the committee would explain a little more fully their reasons in all cases that seem contradictory it would save us from having to read between the lines.

However, I think we can assure the committee we are like the judge who, wishing to make a good impression upon the jury, in his charge said: "Gentlemen, you will base your decision upon the law and the evidence, but whichever way you decide it will be satisfactory to all parties."

J. D. McALPINE.

BOOK REVIEWS

THE PAN-AMERICAN EXPOSITION.

By William I. Buchanan.

This neat little pamphlet, printed most artistically, is a reproduction of an article by Mr. Buchanan, the Director General of the Exhibition, which appeared some time ago in the columns of Collier's Weekly. In reading this article it is impossible not to imbibe some of the fair, broad-minded spirit of the author, who says that the ideal which those who planned the Exposition had in view was to make it a great international "Information Clearing House," and that the scope of the enterprise is not only to provide a beautiful spectacle for millions of people, but to afford an opportunity to the peoples of the three Americas—North, Middle and South—to become better acquainted with each other.

The great pioneer of all international exhibitions, the one held in London in 1851, which was projected by Prince Albert, was carried through in the face of opposition which at this distance of time appears to be incredible. In the upper house, a writer in the Anglo-American Magazine, tells us, "Lord Brougham denied the right of the Crown to hold the exhibition in Hyde Park, and in the Commons it was prophesied that England would be overrun with foreign rogues and revolutionists, who would subvert the morals of the English people, steal their trade secrets from them and destroy their faith in their religion and their loyalty toward the throne." That the very reverse of all this happened, and the great benefits the exhibition brought to Great Britain are now matters of history. The exhibition of 1851 was a colossal success; the results soon became manifest in the complete renovation of many English processes of manufacture.

Mr. Buchanan says, "No one who has approached the subject of industrial Pan-America seriously believes that the artificial trade conditions now existing between Canada, the different Central and South American republics, and the United States—as they affect and restrict commerce and communication between the different countries—can long continue." Whether or not the reader will agree with this opinion, one thing is certain, that if any improvement is ever to be made in the direction indicated, one of the most potent factors will be the influence upon public opinion of a gigantic object lesson, such as the Pan-American Exhibition is designed to be. As the late Prof. Huxley, in his life's work, collected and tabulated information for one of his most important essays, "Evidences as to Man's Place in Nature," so a nation will secure reliable testimony as to its real place in the world, will see its own advantages and deficiencies, will gain accurate knowedge of where to expand and how, not by complacent introspection, but by the silent measuring of results—of work acomplished by the family of nations on this hemisphere, which will be presented to the intelligent observer in the courts and halls of the Pan-American Exhibition, where the progress of each will be written in the language of achievement, and by which each will say to the world, "Speak of me as I am, nothing extenuate, nor set down aught in malice."

HYDRAULIC JACKS

The Watson-Stillman Company's catalogue No. 61 has been received. Railroad men in the mechanical department who have had requisitions for jacks, etc., cancelled or cut in two by superior officers will look with longing eyes at the assortment displayed in the pages of this catalogue, but the fortunate man who has *carte blanche* to get what he wants will revel in the plain, broad base, hook head claw, independent

claw, wrecking hydraulic jacks, to say nothing about the swivel claw, journal box "low," horizontal, independent pump hydraulic jacks. Then there is the improved hydraulic pulling jack, and the horizontal pulling jack and the transfer pit jack; the standard screw jacks, tripod ratchet, telescope traversing jacks, with a whole family of track jacks and box screw claw jacks. We have not enumerated all that is to be found in the catalogue. "There are others." The catalogue may be had from the company, 204-210 East Forty-third street, New York.

AMERICAN BRAKE SLACK ADJUSTER

In glancing over the pages of the 1901 catalogue of the American Brake Company one is delighted with the excellence of the full page half-tones with which the book abounds. It also appears that the brake slack adjuster, with which this catalogue is concerned, models its behavior upon good judgment and sound sense. The slack adjuster is a conspicuous example of "letting well alone." It does not wear itself out in the futile endeavor to take slack where none exists. It remains passive until some slack shows itself, and then, if we may be allowed the expression, it promptly "nips it in the bud." The catalogue clearly explains the device, and has pages where details are numbered for ordering parts. The book is very valuable for reference.

THE METRIC SYSTEM

With a view to popularizing the metric system, the *Canadian Engineer*, of Toronto and Montreal, Canada, has issued a chart or poster upon which a meter is laid out in full, with its ten divisions, each a decimeter, and each of these is divided into centimeters and millimeters. The measures of length are also enumerated in a table, after which follows the table of the measures of area. The measures of volume are graphically represented by a cubic decimeter and its equivalent, the liter, which resembles a quart mug. The measures of weight come next, with the kilogram represented graphically. Then follows a table with the English equivalents for the meter, the square meter, the hectare, the cubic meter, the liter, the gram and the kilogram. The publishers, Biggar, Samuel & Co., of 62 Church street, Toronto, will send this poster to anyone on receipt of 10 cents.

BRAKE SHOES

The American Brake Shoe Company has issued a neat little trade catalogue giving information concerning their wares. Among other things, they offer "Tire dressing, high friction, extra durable and extra strong brake shoes." The form of the skeleton shoe, the Sargent, is familiar to railway men. It grips the flange and has two open spaces which fit over that part of the wheel which has contact with the rail. Among the driving brake shoes of this type there is the open hearth steel shoe, the cast iron, with crucible steel inserts, the cast iron with expanded metal inserts, the semi-steel body with chilled areas or steel inserts, the cast body and reinforced back with steel inserts, the Heron shoe, and lastly, the Ross or "V" shoe semi-steel body, ends chilled from back and crucible inserts if desired. The five styles of car brake shoes are similarly illustrated, and under all the illustrations a short paragraph explains the merits and advantages of each form of braking apparatus.

RAILWAY WATER SUPPLY

The Otto Gas Engine Works has issued a catalogue which is arranged to show existing methods of applying gas and gasoline engines to pumping devices of the most suitable kind, also a complete line of appliances for locomotive water supply. A number of half-tones and engravings, accompanied with considerable data, are devoted to pumping engines of all kinds. The Otto special electric light gasoline engine driving dynamo by direct belt is shown, also a new design of special electric light engines. The pneumatic tool car, which is a flat car with Otto engine air compressor and cooling tanks, as fitted up for the C. & N. W. Railway, is given. Otto hoisting gear comes next, and then follows the locomotive water supply, railroad tanks and details. The Haliday slow-closing outlet tank valve and the Snow-Milne patent outlet valve with cushion device are illustrated. This latter is described as a valve without a seat, without water hammer, in which vacuum is impossible. It gives full area of opening with but one-half usual cap load. The cushion device can be applied to any style of outlet valve. The Otto Company is prepared to send a valve on trial. The catalogue may be had on application to the Otto Gas Engine Works, 360 Dearborn street, Chicago, Ill.

BALDWIN RECORD OF RECENT CONTRUCTION.

Catalogue No. 23, or "Record of Recent Construction," issued by the Baldwin Locomotive Works, contains the very interesting paper on Locomotive Boilers, which was read by Mr. Cornelius Vanderbilt, M. E., at the January, 1901, meeting of the Junior Members of the American Society of Mechanical Engineers. It is illustrated by a number of diagrams printed in purple ink, a half-tone showing the Vanderbilt corrugated firebox as it came from the hands of the Continental Iron Works, of Brooklyn, N. Y., and two half-tones, with outline details showing the Baldwin engines built with Vanderbilt boilers for the Union Pacific and the Baltimore & Ohio Railroads.

FIRST AID TO THE INJURED AND AMBULANCE DRILL

By H. Drinkwater, M. D.

This little book of just 100 pages, which are about 4 by 6 inches, is published in New York by the Macmillan Company, of 66 Fifth avenue, for 25 cents. The keynote of the book is, "*practical*," the author acknowledges that there are good books on first aid before the public, but others, he thinks, are too full of theoretical matter, and others again he objects to in the matter of illustrations.

Dr. Drinkwater, in his opening sentence, gives its quietus to the absurd notion that first aid makes ordinary mortals, physicians and surgeons. He says: "First aid lectures aim at teaching what should be done in cases of sudden illness, and especially what should be done *first* before the surgeon arrives." He says again: "My aim is to place the subject before you in as clear a form as possible and to tell you only what is actually necessary to enable you to understand the subject thoroughly." We think Dr. Drinkwater succeeds in doing this. His illustrations are clear and, as far as possible, free from technicalities. He calls the bone forming the heel, the heel, not the os calcis. The sinew which joins the muscle forming the calf of the leg to the heel, and which even "the man in the street," has seen in butcher's shops used to suspend from hooks the carcass of a sheep or a side of beef, and which is the strongest in the body he still calls sinew. With much temptation to do otherwise, due to the classical story connected with its name, he omits all mention of the tendo Achilles. We give these examples to show that the author is in earnest when he says that he desires to be practical.

The famous triangular Esmarch bandage and its various uses are explained. It was said with much froth and more mendacity in the days of the First Napoleon that every French soldier carried a marshal's baton in his knapsack, meaning that promotion might come to any man, however lowly, but we believe that it can be said with more regard for fact that the Esmarch bandage is to-day carried in the knapsack of every German soldier, and men who appreciate Dr. Drinkwater's endeavor to be *practical* will applaud the German practice. The bandage has stamped on it pictorial representations of how it is to be used, and those not familiar with its capabilities will be surprised at its many and clever applications.

The position of the arteries and how to compress them are shown in numerous illustrations, the ready tourniquet made with handkerchief and stick are fully set forth, and of course how to tell whether an artery or a vein is bleeding is given clearly and plainly.

Broken bones and the four-tailed bandage are taken up, together with how to apply splints.

The book is well illustrated throughout, and shows how to deal with drowning accidents (the same treatment being applicable to electric shock accidents). How to carry a patient on the two-hand seat, the three-hand seat, and the four-hand seat are all illustrated. The book concludes with "stretcher exercise," gives a list of standard works and an alphabetical index of subjects.

Record of New Equipment

Ordered during the Month of March 1901

CARS

Ordered by	No.	Class.	To be built by
Ala. & Vicksburg....	1	Coach.	Am. Car & Fdry. Co.
Atlantic Coast Line..	100	Flat.	Own shops.
Baltimore & Ohio....	1,000	Freight.	
Butte, Anaconda & P.	100	Ore.	Pressed Steel Car Co.
Chesapeake & Ohio..	1,000	Coal.	
" " " ..	400	Hopper.	Pressed Steel Car Co.
" " " ..	300	Box.	Pullman Car Co.
Chicago Great West..	800	Box.	
" " " ..	100	Box.	Am. Car & Fdry. Co.
" " " ..	400	Gondola.	
" " " ..	500	Stock.	
" " " ..	300	Flat.	
" " " ..	100	Ballast.	Rodgers Ballast Car Co.
Chi., Mil. & St. Paul.	10	Passenger.	
" " " "	4	Sleepers.	Pullman Car Co.
" " " " "	2	Dining.	" " "
" " " " "	1 000	Box.	Own shops.
C., St. P., Minn. & O.	1.000	Coaches.	Pullman Car Co.
Chi. & E. Illinois....	10	Cabooses.	Mt. Vernon Car Mfg. Co.
Cleveland Prov. Co..	2	Freight.	Am. Car & Fdry. Co.
Colorado Midland.....	10	Coal.	Own shops.
Col. & B. L. T. Co...	5		Jewett Car Co.
Cudahy Refrig. Line..	217	Refrig.	Am. Car & Fdry. Co.
Dayton & Union	2		Barney & Smith.
Det. & Mackinac....	75	Flat.	" " "
" "	50	Box.	" " "
" "	25	Stock.	" " "
Dul., So. Shore & Atl.	6	Passenger.	Am. Car & Fdry. Co.
" " " "	175	Coal.	" " " " "
Empire Const. Co....	50	Freight.	Haskell & Baker Co.
Ft. Smith & Western.	600	Coal.	Illinois Car & Equip. Co.
Georgia R. R........	300	Box.	Own shops.
Grand Trunk	500	Box.	" "
Great Northern.......	50	Coaches.	Barney & Smith.
" "	4	Dining.	" " "
" "	24	Passenger.	Am. Car & Fdry. Co.
" "	6	Comb.	" " " " "
" "	2	Mail.	" " " " "
Gulf & Ship Island...	40	Flat.	" " " " "
Hancock & Calumet.	175	Freight.	" " " " "
Ingolsby A. Car Co.	315	Autom.	" " " " "
Louis., Hen. & St. L.	25	Coal.	" " " " "
" " "	5	Stock.	Pressed Steel Car Co.
Louisville & Nashville	3	Passenger.	
Macon, Dublin & Sav.	250	Box.	
" " "	250	Coal.	Rodgers Ballast Car Co.
Mason City & Ft. D.	100	Ballast.	Pressed Steel Car Co.
Marq. & Southeastern	25	Box.	Am. Car & Fdry. Co.
Met. "L," Chicago...	40	Coaches.	Jewett Car Co.
" " " ...	10	Motor.	
Mexican Central......	100	Box.	
" "	100	Stock.	
" "	50	Coal.	Am. Car & Fdry. Co.
M., St. P. & S. S. M.	300	Box.	" " " " "
Minneapolis & St. L.	1	Comb.	Pressed Steel Car Co.
Mich. Alkali Co.......	70	Freight.	Am. Car & Fdry. Co.
Mineral Range Road.	175	Ore.	" " " " "
Missouri Pacific......	500	Flat.	Sterlingworth R'y S. Co.
Morenci Southern....	6	Gondola.	Am. Car & Fdry. Co.
Nat. of Tehuantepec.	29	Freight.	Own shops.
Nelson Morris & Co..	25	Freight.	Southern C. & F. Co.
N. Orl. & Northeast.	100	Freight.	Am. Car & Fdry. Co.
" "	200	Freight.	Harlan & Hollingsworth.
New York, O. & W..	8	Passenger.	Own shops.
Norfolk & Western..	5 0	Coal.	
Fairbanks & Co......	10	Tanks.	Jackson & Sharp.
Pennsylvania	78	Passenger.	Am. Car & Fdry. Co.
Pere Marquette.	500	Box.	" " " " "
" "	100	Gondola.	Pullman Car Co.
Pullman Co	6	Coaches.	Am. Car & Fdry. Co.
Queen & Crescent....	2	Coaches.	" " " " "
Quincy Mining Co....	4	Flat.	Rodgers Ballast Car Co.
Rio Grande Western.	50	Ballast.	" " " "
" " " .	50	Distrib.	
S. P., Los A. & St. L.	125	Flat.	Am. Car & Fdry. Co.
" " " " "	25	Refr'g.	" " " " "
Shreveport & R. Riv..	30	Flat.	" " " " "
St. Louis Refrig. Co..	100	Box.	" " " " "
St. Louis & San Fran.	5	Chair.	" " " " "
St. Louis Southern...	1,000	Box.	" " " " "
Southern	75	Furniture.	" " " " "
Southern Mo. & Ark.	15	Coal.	" " " " "
" " "	15	Flat.	" " " " "
" " "	10	Dump.	" " " " "
" " "	1	Coach.	" " " " "
" " "	1	Comb.	" " " " "
" " "	1	Mail.	" " " " "
Southern Pacific	100	Ballast.	Rodgers Ballast Car Co.
" "	25	Passenger.	Pullman Car Co.
" "	20	Passenger.	Am. Car & Fdry. Co.
S. Pierson & Co.....	50	Freight.	" " " " "
Texas Central.......	20	Flat	" " " " "
Tol. Peoria & West .	50	Freight.	Mt. Vernon Car Mfg. Co.
Vera Cruz & Pacific..	30	Box.	Am. Car & Fdry. Co.
Vick., Shreve. & Pac.	1	Cafe.	" " " " "
Wabash	1,000	Box.	" " " " "
"	500	Flat.	" " " " "
Ala. Gt. Southern....	4	Consol'n.	Richmond Loco Works.
Bangor & Aristook...	10		Manchester Loco. Wks.
Buff. Roch. & Pitts..	2		Baldwin Loco. Works.

LOCOMOTIVES

Ordered by	No.	Class.	To be built by
Chic., Mil. & St. P...	9	Switchers.	Own shops.
Chic., Mil. & St. P...	3		Schenectady Loco. Wks.
Cin., Ham. & Day...	5	10-wheel.	Pittsburg Loco. Works.
" " " " ..	2	6-wheel.	" " "
Colo. Sp. & Crip. Ck.	1		Schenectady Loco. Wks.
Copper Range	1		" " "
Cuba Co	6		International Power Co.
Ecuadorian Assn. ...	2		Baldwin Loco. Works.
Georgia Central	5	Consol'n.	Cooke Loco. Works.
Georgia Pine Road...	1		Baldwin Loco. Works.
Great Northern	30		Brooks Loco. Works.
" "	20		Rogers Loco. Works.
" "	10		Cooke Loco. Works.
Gulf & Ship Island...	2	Passenger.	
Gulf & Ship Island...	2	Freight.	Baldwin Loco. Works.
Ind., Ill. & Iowa.....	12		
Intedcolonial of Can.	10		Manchester Loco. Wks.
" " "		Consol'n.	Canadian Loco. Works.
Lehigh & New Eng..	2		Cooke Loco. Works.
Macon, Dub. & Sav..	3		Baldwin Loco. Works.
Mex. C. & C. Co.....	1		" " "
Minn. S. P. & S. S. M.	4	Consol'n.	Schenectady Loco. Wks.
Mo. Kan. & Texas...	5		Brooks Loco. Works.
Miss. Riv. & B. T....	2	Consol'n.	Richmond Loco Works.
" " "	1	Passenger.	" " "
Missouri Pacific	10		Brooks Loco. Works.
Morenci Southern. ...	2		Baldwin Loco. Works.
New Zealand Gov't...	6		" " "
N. Y. Ont. & West..	4		Cooke Loco. Works.
Pere Marquette	10		Brooks Loco. Works.
Prince Edward Island	2	Passenger.	Canadian Loco. Works.
Quebec Southern	1		Baldwin Loco. Works.
Rich. Fred. & Pot...	4	10-wheel.	Richmond Loco Works.
Santa Fe	40		International Power Co.
Sandy Hook P. G.....	1		Pittsburg Loco. Works.
So. Mo. & Arkansas.	1		" " " "
St. Law. & Adiron...	3		Schenectady Loco. Wks.
Tionesta Valley	1		Brooks Loco. Works.

MISCELLANEA

The Consolidated Railway Electric Lighting and Equipment Co., 100 Broadway, N. Y., has reproduced in pamphlet form the article entitled "The Lighting of Railway Cars," which Prof. George D. Shepardson of the University of Minnesota contributed to the May "Forum." This is an interesting article, and since this company has brought it out in a handy form for free distribution it is well worth sending for.

The American Sheet Steel Company has started its sheet mill at Canton, O., after a long idleness.

Owing to the election of Mr. Rolla Wells to the mayoralty of St. Louis, there has recently been a change in the officers of the American Steel Foundry Company. Mr. Wells becomes chairman of the board of directors, and Mr. E. F. Goltra president. Mr. O. S. Pulham is secretary, and Mr. L. J. Hayward treasurer. The company has bought the Sligo furnace of the Ozark region in Dent County, Missouri, and will make its own charcoal pig-iron.

The Pressed Steel Car & Wheel Co., with head offices at Perth, Ont., has been incorporated with a capital of $700,000, with James A. Mitchell, John A. Currie, Neil McLean, Alexander McDonald, and Arthur C. McMaster, all of Toronto, as provisional directors. The company will manufacture steel cars, car wheels, railway equipments, etc., and will also build ships, bridges, elevators, etc.

The Buckeye Malleable Iron & Coupler Co., of Columbus, O., has lately increased its capital stock from $500,000 to $1,000,000.

The Bullock-Wagner Sales Organization has established a district office at No. 1624 Marquette Building, Chicago. It will be in charge of Mr. H. B. Foster, who has for about two years served the Wagner Company as sales agent. He will have the able assistance of Mr. E. W. Goldschmidt, formerly of the Western Electric Company, in covering this important field.

RAILROAD DIGEST

Formerly The Railroad Car Journal

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EDWARD A. PHILLIPS GEORGE S. HODGINS, Editors

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Coal Handling

We remember hearing a bank clerk make a somewhat startling statement to the effect that if he heard of a man who could keep his "petty cash" correctly day in and day out in a busy bank he, the speaker, would be inclined to doubt such a man's honesty.

We do not venture an opinion on the subject of cash, petty or otherwise, but we have often been tempted to doubt the accuracy of statements regarding coal consumption made by men who, from the circumstances of the case, were compelled to estimate the amount of coal delivered to engines and to strike a balance between what had been bought by the company and what had been taken by the locomotives.

In the discussion following two reports at the recent Master Mechanics' Convention involving the handling of coal, Mr. Miller, in one case, and Mr. Delano, in another, spoke of the importance of actually weighing coal out to engines and not guessing at the amount. Some roads buy coal by weight, and then have it shovelled into pockets, each pocket being filled up to a certain level in order to make 2, 3, 5, or more tons, as the case may be. A locomotive engineer has then, if we may so say, to buy the contents of one or more pockets by giving a coal ticket, upon which he states the number of tons required. The *tons* which the company originally bought and the "tons" which the company is "selling" to him are of two different kinds. The first is weight pure and simple, the second is only a measure of volume.

If some commodity such as water was being disposed of by volume, while being spoken of and recorded as if by weight, any discrepancy between the two would not be great, because there would be a definite fixed ratio existing between them, and the surface of the fluid would always be perfectly level. With coal the ratio between weight and volume is always variable, and its uniform level in the pocket is uncertain and may indeed sometimes be largely a matter of understanding between a particular locomotive runner and the coal shoveller.

It has been argued that even if the so-called tons delivered on the tender are in reality quantities, the volume of which alone is known, yet such delivery would be as fair for one engine as another, whether the amount received and given out tallied or not at the end of the month. This might be true if the weight and volume of coal stood at a constant ratio, but they do not. A carload of lumpy coal and a carload of fine brittle coal, even if filled fairly to the same levels in the pockets, would represent very different weights of fuel, although all might be spoken of as "tons." "A ton of coal, if called by any other name, should weigh as much" as any other, if the reader will permit the altered quotation.

In these days when detailed cost is constantly asked for concerning all matters of railway operation it behooves the motive power department to be strictly accurate, especially in coal handling.

The statement that three tables equal six chairs would not be admitted by a mathematician as an equation at all, because there are on each side a number of things which are not connected, or even connectible by any known ratio, and the so-called equation which endeavors to place accurately weighed tons of coal on one side and measures of volume on the other without being able to connect them by a constant ratio is a grave mathematical inaccuracy to say the least. It, therefore, seems to us that a man who apparently is always able to strike an accurate balance month in and month out between what he receives, measured in one way, and what he parts with, measured in another and variable way, ought to be able to turn his attention to petty cash if the bank clerk's estimate of character was at all within the mark.

The Behavior of Trucks on Curves

A very important point was touched on by two speakers in the discussion following the reading of the report on draft gear at the Master Car Builders' convention. The point made was that there was not enough side play in draw gear at the present time. The old link-and-pin drawbars allowed all the lateral motion that was necessary, but with the advent of the M. C. B. coupler most of this, if not all, disappeared. Mr. Schrayer explained that on the C. & N. W. Railroad they had tried the experiment of putting in two blocks of lead, one on each side of the coupler, and resting upon the carrier iron. This was done on one of their large tenders, which was coupled to a long car. After running a trip the lead blocks were found to have been compressed about 5-8 of an inch, owing to the effort of the coupler to move sideways when passing around curves. Two similar blocks of lead were placed in a testing machine and compressed 5-8 of an inch. The pressure necessary to do this was found to be 57,000 lbs.

The interesting point to be borne in mind in this connection is the enormous flange friction, which must be set up or caused by the side pressure upon the car, caused by the couplers in their effort to assume a normal position on a curve. Last month we invited the attention of our readers to the consideration of the wear of rails on curves, and we showed that at high speeds the outer and higher rail of the curve was probably the recipient of all the flange friction, especially if the train was drifting. When a train was started from rest on a curve, part of the train probably causes flange friction on the inner and lower rail, and it will do the same thing if it has little or no momentum.

It is now evident that this side pressure caused by the effort of the couplers to assume their natural positions in the line of pull on a curve will certainly tend to counteract and diminish the flange friction on the outer and higher rail of a curve.

Anyone who has noticed the enormous side movement of the drawbars used in coupling cars on the Manhattan Elevated road in New York, when the cars are passing around the sharp curves on that line, will appreciate the effect of restricting the side play of M. C. B. couplers on steam roads.

This restricted movement means increased flange friction, and the tendency is to throw it upon the lower and inner rail of the curve. All trains offer more resistance on curves than they do on tangents, owing to the slip of one out of every pair of wheels. There is in addition to this the flange friction due to the deflection of the cars in passing around the curves, and at slow speeds when some flange friction is produced upon the inner and lower rail, it is probably augmented to a very serious extent by the want of side play in the couplers. Anything done in order to give freer side movement of couplers consistent with safety, will have an immediate and direct bearing upon the tonnage hauled, and the coal economy of the locomotive.

Locomotive Classification

The discussion on Mr. R. C. P. Sanderson's paper on "A Classification of Locomotives" at the Master Mechanics' Convention was one in which all agreed that a very simple formula was the desideratum. Many and various, however, were the items of information which were sought to be embodied in the formula. The *Railway Age* in poking a little harmless fun at the members has reminded us of an article which appeared some years ago in one of the English reviews. The writer then criticized the report made to the War Office by a Royal Commission appointed to consider the merits of small arms. The criticism was to the effect that the commission having found so much fault with existing firearms appeared to be looking for a light, but powerful, magazine rifle which should be inexhaustible in its supply of cartridges, which should never foul or heat however rapidly fired; it should always be able to hit the mark, whether aimed carefully or otherwise, that it should insure certain victory everywhere, and if for any reason the mechanism should become temporarily deranged it should ring a bell and so acquaint Tommy Atkins with the fact that it was out of order even amid the heat and smoke of battle. In short, this remarkable rifle should secure all the attributes which no existing weapon possessed, and so be practically perfect.

"The force of a saying lies in its application," and we respectfully recommend this alleged effort of the British War Department, to the attention of our friends who are interested in locomotive classification.

The question may be considered on either side of its natural "line of cleavage." Is the classification formula to be for the use of all railroad mechanical men, builders and others possessed of a certain amount of technical knowledge, which, when used, shall give roughly the style or type of engine without burdening either speaker or listener with a mass of more or less elaborated detail or, on the other hand, shall the classification be such that information shall be supplied by it to the non-technical transportation officer by which he may determine the service for which the engine is best suited? If the former is decided upon the problem is comparatively simple; if the latter, it would probably be more complicated. The Whyte system fixes the wheel arrangement beyond doubt, and without any ambiguity. If desired, the size of cylinders might be added as a fraction with the letter S or C for Simple or Compound If the information contained in the formula is for transportation officers, then haulage capacity at a known speed or speeds will be required, together with some indication of the engine's grade-climbing abilities. These points it seems to us should be furnished by the motive power department of each road to its own transportation officers.

Some underlying principle should govern the classification formula of the future. It is impossible to have it simple and compact, requiring no effort of the memory, and yet at the same time expect it to give the wheel arrangement, the size of cylinders, the pressure carried, the grate area, the number of flues, the diameter of the exhaust nozzle, the size of drivers, simple or compound; maker's name, tonnage it can haul, total heating surface, whether cab is placed centrally, or otherwise, when boiler was last washed out, what make of injector the engine likes best, or what it thinks of the grades it is expected to climb, together with information which will please the yardmaster.

A sister society concerned with maintenance of way matters has recently defined the word "yard" and "terminal" much as a probate court might determine the technical meaning of a specific word used in a will, and it is yet open to the Master Mechanics' Association to define type names definitely and authoritatively so that the word "Atlantic" shall mean only one certain type, and Decapod, Prairie, Mastodon, "Chautauqua" and "Northwestern" would either then mean something specific or drop out of official nomenclature altogether. The question has, however, been "referred back," and the committee on "subjects" now has the floor.

THE AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION

Thirty-fourth Annual Convention, June, 1901

The thirty-fourth annual convention of the American Railway Master Mechanics' Association was held June 19, 20, and 21, last, at Saratoga Springs, N. Y. The meeting was called to order by the president, Mr. W. S. Morris, on the morning of June 19th. As this meeting was the first of the new century, the ex-presidents of the association were invited to take seats on the platform. The Rev. Joseph Carey, D.D., rector of the First Episcopal Church of Saratoga, opened the convention with prayer. The president of the village, Mr. A. P. Knapp, in a brief address welcomed the association to Saratoga. Mr. G. W. West, responded in the name of the association to Mr. Knapp's welcome. Mr. Morris, president of the association, then delivered his address. It was, briefly, as follows:

PRESIDENT'S ADDRESS.

After complimenting Saratoga as an ideal convention place and urging the members to continue their efforts in the direction of advanced methods, the President lauded the last three-quarters of the past century, saying that in that period was contained the entire development of railroad transportation. From 1897 to 1899 the freight traffic of the country had increased 30 per cent., while the increase in population was about 2 per cent This increased business was met by an increase in the number of freight locomotives of but 1.6 per cent. and in freight cars of but 6 per cent. He quoted other figures to show the vast increase of freight traffic and trainload during late years. He divided this country's railroad history into four parts: Establishment, extension, improvement on the original conception, and the introduction of scientific training into locomotive building, equipment and operation. Owing to the increase in numbers and capacity of the organizations, systematic co-operation should be inaugurated, and the whole of motive power progress recorded. To this end invitations have been extended to the traveling engineers, air-brake men, blacksmiths and painters, and next year the society will hear from them to the mutual benefit of all concerned. More attention must be given to organization, and such perfection reached that will enable the members to rise above details and give them a sort of bird's eye view of the department and its responsibilities. He referred to the growth in kinds, sizes and hauling capacities of the locomotives of recent years, regretted that the status of the compound locomotive is not yet determined, and advocated intelligent study of the same. Boilers next claimed the speaker's attention. He said an example of progress in boiler construction was the self-sustained fire-box, the object of which is to eliminate stay bolts and to promote circulation.

The operating department must now be recognized as the factor for the basis of charge for the sale of a railroad's product, and as far as consistent economy may be exercised in the care and handling of the transportation department, in such proportion will be the share of prosperity. Master mechanics should be courteous and give fair treatment to all their subordinates; apprentices should be encouraged, and night schools established wherever feasible. Pneumatic, electrical and hydraulic devices have become a necessity on account of the heavy haulage of the past year. Gas engines are prominent in engineering practice, and electricity with all its applications is found in our shops, as is also the air compressor. Flanging, shaping, riveting and punching is now done by hydraulic means. Improved facilities of turning engines at terminals is now a necessity on account of the increasing yearly mileage of passenger and freight engines. Unnecessarily long stops and slack-ups should be done away with, as they virtually mean the same as loss of speed and time while running.

A compliment was paid to Purdue University for its progress in railroad studies. The names of the members deceased since the last convention were announced. After a short talk on the importance of the members lending their efforts to make the present convention as well as future ones highly successful, the President concluded by thanking the speakers at the opening meeting, and the officers and committees.

Amendments to the Constitution and By-Laws

The first change is in Article III, Section 2, where the election of members was formerly by ballot; it is now to be by letter ballot.

The next change was in Section 5 of Article III, which deals with the making of honorary members. The amendment makes all members eligible by saying "Members of the Association, both active and associate." Also the nomination for such honorary membership must be made by the Executive Committee.

Article V, Section 1. The appointment of committees is to be made by the president; the words "except as hereinafter provided" were added in amendment.

Article IX, Section 3, gives presidents power, in addition to appointing committees, to appoint individuals to investigate and report. Furthermore, "individual papers may be presented to the association after approval by the Executive Committee. Papers and reports shall be presented by abstracts, which shall not occupy more than ten minutes in the reading unless otherwise ordered by the association."

There was practically no discussion on the modification of the Constitution and By-Laws. All the changes suggested by the committee were agreed to with the exception of Article VII., Section 1. This remains as it was originally, and that being the case, the proposed change in the By-Laws No. 7 in the Order of Business, relative to the appointment of a Nominating Committee, also disappears.

Relative Merits of Cast Iron and Steel Tired Wheels

REPORT OF COMMITTEE.

Since the date of the last report of this committee there have been practically no new developments or new information obtained bearing on this subject. The committee has nothing, therefore, of value to present. Since the last report of this committee the question has been raised as to the expediency of the use of steel tired wheels under 100,000 lbs. cars, but the data in this matter is so deficient that it cannot be properly made a subject of report. The committee asked to be discharged.

DISCUSSION.

In the discussion upon the report of this committee Mr. R. P. C. Sanderson gave some interesting figures as to the relative cost of the two kinds of wheels. He said his figures were not based on any special make of wheel, but were upon average performance, based on conditions which might fairly be assumed. He took as an example the cost of a cast-iron centre, with steel tire fused on, at $45, and that of an ordinary cast-iron wheel at $8.50. He assumed the life of this steel tired wheel to be, before turning, 300,000 miles, and that of a cast wheel, before being scrapped, 50,000 miles. The average daily mileage of a coal car of 100,000 lbs. capacity to be 45 miles.

Taking ten wheels (steel tired) to first turning, cost of turning and replacing, and adding 5 per cent. interest, and repeating the operation for second and subsequent turnings up to the point when the wheel was completely worn out. He placed the net cost for 3,000,000 miles (10x300,000) at $1,071.43, or 35.741 cents per 1000 miles.

For ten cast-iron chilled wheels a similar calculation showed $580.60, or 19.689 cents per 1,000 miles.

Now, assuming that the steel tired wheel was capable of being retired and cost, say, $55, when the first tire was worn out the centre would be, say, only about three-quarters worn out, and allowing 18 years for the life of the tires, perhaps three, in all, he said, instead of scrapping, the wheel centre would practically be good. It amounted to this, that if one came to the point of using steel-tired wheels, the best wheel would, in the long run, be the cheapest.

Mr. Mitchell said that after talking to reputable wheel makers, he was convinced that an eight-dollar wheel was not safe for service under 100,000 lbs. capacity cars, and that a twelve-dollar wheel was more like what was required.

Mr. Leeds thought that a more perfect truck was required for cars of this capacity, and that a thicker flange was required, even though it slightly advanced the price.

No report was presented by the committee on ton-mile statistics, as the members had failed to agree. During the discussion it was pointed out that the matter was also under consideration of the American Railway Association and is also being considered by the Association of Railway Accountants. The motion finally carried was moved by Mr. C. H. Quereau and seconded by Mr. T. H. Symington. It was that the sense of this meeting is that the ton-mileage of locomotives is a just credit to the motive power department for statistical purposes.

A Standard Locomotive Classification

BY R. P. C. SANDERSON.

The number of letters and articles which have appeared in the technical press indicates that a standard locomotive classification is apropos at the present time. Class letters on any one railroad, following each other in alphabetical order in accordance with the dates at which the different classes evolved themselves, is satisfactory only to those connected with that road, but does not convey to an outsider any information which would enable him to tell the design, power, or anything else in connection with the engine. The "Creeper-Bronco-Mudhen" classification, which is the popular (though not official) style among the employees of many roads, though more suggestive than the letter classification, cannot be considered as a standard method. Classification schemes based on wheel arrangements alone do not convey enough information to the transportation officers. Other systems require the use of a key. The writer believes that a classification to be generally useful should fill the following requirements: 1. It should give an immediate mental picture of the style of engine. 2. It should give correct information as to the power of the engine. 3. It should designate, for the benefit of the mechanical department, the particular make of engine. To comply with the first requirement, the initial letter of the recognized type name would be the best class letter to use; thus: E, for eight-wheel engines; T, for ten-wheel engines; V, for twelve-wheel engines; C, for consolidations; M, for moguls; S, for switch engines; A, for Atlantic type engines, and P, for the Prairie type.

In order to indicate the power of an engine so that any transportation officer would be able to form some idea of the hauling capacity of the engine, it was suggested that, for this purpose, the hauling capacity in tons, at ten miles per hour, on straight, level track, could be figured under the formula $H = \frac{T}{R} - W$, where T equals the tractive force in pounds, figured by the usual formula on a basis of 80 per cent., of boiler pressure as mean effective pressure, R representing 5.25 lbs. equal to the speed resistance per ton, and W the weight of the engine and tender in tons. This would figure out anywhere from 2,400 tons to 7,500 or 8,000 tons, ranging from a 17-inch cylinder to a 22-inch cylinder. The first two figures representing hundreds would be sufficient, so that an engine classed as "T 37" would represent a ten-wheel engine of 37,000 tons hauling capacity on a straight, level track at ten miles an hour.

For mechanical department officers a further piece of information might be necessary. A road might possess several types of engines classed T 37, and these could be distinguished by a small affix letter, as T 37 a and T 37 b, and so on.

Switching engines could be designated S4, for a four-wheel coupled switch engine with no truck; S6, for a six-wheel coupled; S8, for an eight-wheel switcher; ST, for a ten-wheel switcher; SC, for a consolidation switcher, and SM, for a mogul switch engine.

The one point which the writer had not been able to scheme out in the allotted time was some means of distinguishing a passenger from a freight engine.

Another point was the difference in engines of equal cylinder power, which being short of heating surface and boiler capacity may not be able to exert their full cylinder power.

DISCUSSION.

Mr. R. P. C. Sanderson's paper provoked some discussion, and was led off by the reading by the secretary of a short paper by Mr. F. F. Gaines, mechanical engineer of the Lehigh Valley, in which each type should be known by some distinctive letter, the class to be indicated in two ways: one placed on the cab pannel for the transportation department, and one carried on the smoke-box for use by the mechanical department: the latter would show the wheel arrangement, driving, truck and trailing, the diameter of the driving wheels, the diameter of the cylinder, and whether the engine was simple or compound. More information may be desirable, but so much can be given by a formula not too intricate. The April, 1901, issue of the American Engineer gives full information of this system.

Mr. Angus Sinclair supported Mr. Sanderson's method and thought it about the best he had seen.

Mr. George Fowler supported the adoption of Mr. Whyte's system (for full explanation see Digest for April, 1901). He said that there was no system followed now about the names applied to types. It was an effort of memory to carry in the mind the fact that a "Chautauqua" or a "Northwestern" were all one with the Atlantic type. At one time engines had been named, but as locomotives were built in increasing numbers, these names had given way to numerical designation, so also the type names might now with propriety give place to the very simple and effective numerical plan proposed by Mr. Whyte. Anyone who understood English and knew the basis of this system could without any effort of memory tell what the wheel arrangement of an engine was by Mr. Whyte's nomenclature. In it a mogul was a 2-6-0, and Atlantic type a 4-4-2, etc., etc. Mr. Fowler moved that the Association endorse this system.

Mr. Symington opposed the system as being of little value to the association.

Mr. P. Leeds seconded Mr. Fowler's motion, because the Whyte system was simple, clear, and did not need an effort of memory. It also, when used as it was intended among different companies, between builders and railways, among engineers and in the technical press, did not interfere or even touch any individual system which might prevail upon any road.

Finally, upon amendment moved by Mr. G. R. Joughins, the matter was referred to the committee on subjects.

LUBRICATING DRIVING AND TRUCK AXLES.

The topical discussion upon the proper method of lubricating locomotive driving and truck axles was opened by the reading by the secretary of a short paper from Mr. G. R. Henderson, in which he criticised existing methods very severely, but professed himself as unable to successfully solve the problem. He suggested that if the bearings were constantly flooded by some cheap lubricant, which might be allowed to drip upon the track, the end sought might perhaps be gained. Another method was to force oil to the journal by means of the McKenna pump, one would be sure that the oil used actually did reach the desired parts.

Mr. T. H. Symington advocated the careful exclusion of dust from the top of the box, by covering the pockets with a metal cap, through which four small holes would permit the supply of oil to the journal, the wedges, and between hub and box.

Mr. G. W. Rhodes believed that the successful exclusion of dust and dirt would be an important step in the direction of reducing trouble from hot boxes.

Mr. Miller referred to the great care necessary in fitting up, the exclusion of dust, and the careful proportioning of journal to load to be carried.

SHOULD SIDE RODS BE LEFT ON ENGINES IN TRANSIT?

Mr. William Gartstang opened the topical discussion of the question, "Should side parallel rods be in position on locomotives while in transit?" He said it was known from experience that side rods in place when engine was coming from the builder's was satisfactory to the roads over which the engines had to pass, as the road department of the majority of railroads considered it important for the purposes of track maintenance that these rods should be in place. It also saved money for the railway company in not compelling them to put up these rods on arrival at destination, and that a resolution to the effect that side rods should be on engines when coming from the makers was in order.

Mr. Leeds, in seconding the motion, proposed that main rods should also be on, and crossheads in place.

Mr. Whyte wished also that air-brakes be included in the motion.

Mr. Gartstang then pointed out that experience had demonstrated that side rods should be in place, but as yet main rods had not come within the purview of such experience, and that it would be better to first ascertain if there were on any roads obstructions near the rails which would interfere with big ends of foreign engines when these had big ends the under side of which came very near the tire of the wheel.

The motion regarding the side rods only was adopted by the Association.

Cost of Running Trains at High Speed

REPORT OF COMMITTEE.

The committee sent out the following questions to thirty superintendents of motive power:

1. Can you furnish any data on the comparative cost for fuel consumption alone of running trains, at say fifty to sixty miles per hour, including stops, for 150 miles or more, as compared with the same train making the same stops, etc., and running at a scheduled speed of one-half this?

2. If you have not any complete data on this subject, can you furnish any data bearing upon it?

3. What would you give as a fair valuation of an engine competent to handle a train of four to six cars at a sustained scheduled speed of fifty miles per hour for distances of 150 miles or more, as compared with the valuation of an engine competent to handle the same train, making the same stops, but at one-half the scheduled speed?

4. What data, if any, can you furnish on the matter of the number of breakdowns, or failures of one kind or another, in locomotive performance with engines handling trains at the high speed above mentioned, as compared with the lower speed mentioned?

5. Has it been your experience that the increasing of speed on a few trains has had a tendency of increasing the speed of all trains?

6. Looking at this matter purely from the standpoint of a motive-power man, to what extent, if any, has the general increase in speed and reduction in time added to the first cost of motive power, or the cost of maintenance thereafter?

Seventeen replies were received, of which ten had no information whatever to offer, advising that no data on this subject was available in their records, and thirteen failed to reply at all.

Mr. Quayle, of the Chicago & Northwestern Railway furnished record diagrams of several tests of a freight locomotive made in the testing plant at their Chicago shops. He advised that it was found impracticable on the testing plant to make runs, with the heavy engine used, at higher speeds than forty miles per hour.

A number of replies were received, among them we note that Mr. Barr, of the B. & O. R. R., said: "I have no definite data on the question which you propose, but answering No. 1, I have some reason for saying, from general fuel requirements, that the fast-speed train increases the fuel consumption at least thirty per cent. At the present time, I would say that an engine capable of hauling a four or six car train at a sustained speed of fifty miles per hour, will cost at least fifty per cent. more than an engine competent to handle the same train at one-half the schedule speed."

He quotes Mr. Wickhorst, engineer of tests, as saying in a report made concerning a dynamometer test made on the C., B. & Q. R. R., on mail train No. 15, and a special train of same makeup.

"In general, therefore, we may say that these tests indicate the cost for power as represented by the consumption of coal and water, of running trains, increases directly as the speed; that is, if we double the speed, the coal, water and drawbar pull are likewise doubled."

The report concludes, "The cost of operating high-speed trains where they make stops between terminals, as compared with the cost of operating heavy trains making frequent stops, is

usually a matter of guesswork. In the case of a heavy train making frequent stops, the speed between stations is nearly, if not quite, as high as the speed of the fast train, but the boiler is of course not taxed so severely as when it is required to furnish power continuously.

The tests made by the Burlington Road are of great value so far as they go, and clearly indicate that, so far as coal consumption is concerned, it is fair to assume that the cost increases directly as the speed increases, but your committee realizes that this is only one of the items of the enhanced cost of running trains at high speed.

The greater capital invested in locomotives capable of handling trains at high speed, the greater cost of maintenance, represented in the greater care and more perfect inspection, is spoken of by all who have replied to our queries. Furthermore, it is a pretty generally acknowledged fact that any given class of power will show far more engine failures operated at high speed than at lower speed; that the "keying up" of the service on a few trains tends to key up the service of all trains, and that while there is an undeniable benefit resulting from the greater alertness on the part of the employees there is an expense resulting from these greater demands on engines, requiring more expensive motive power, from machinery failures in both engines and cars, resulting from this greater speed, more serious results from derailments or accidents when they occur, or which involve an expenditure of money to prevent.

As already stated, your committee has only considered the question of cost of running trains at high speed as affected by mechanical considerations. None of the other features of the problem, such as cost of track maintenance, cost of keeping the track clear, keeping trains out of the way of high-speed trains, and many other incidentals, have been considered at all.

DISCUSSION.

In the discussion on this report Mr. Rhodes called attention to Mr. Barr's remarks about the cost of running a train at fifty miles, being fifty per cent. more than that of a train running at half the speed. He said this was no doubt not guesswork, but would like to have it verified and explained.

Mr. Whyte said that coal consumption, in the C., B. & Q. tests, should vary as the speed in the case of trains run at 30 and 60 miles per hour, but that the coal consumption at 20 miles per hour multiplied by 3 would not give the correct figure for 60, nor would 4 times that at 20 miles per hour be correct for 80 miles per hour.

Mr. Deems thought the "keying up" referred to was good all round, as a company got more out of its power even if it paid a little more for high speed.

Mr. Delano said that 50 years ago in England it was thought that the cost varied as the square of the speed, while later a Philadelphia man said high speed cost less than slow speed, because an engine at high speed was on the road a shorter time than a slow one, and so had shorter time to burn coal in. He thought the happy medium was between these. Mechanical men should remember that high speed costs money and should endeavor to make transportation officers understand it also; otherwise they would want all trains run at high speed.

Mr. Symington did not think it true that double the speed cost twice the money, because if every train on any road was to be reduced 50 per cent. in speed, no one would reduce the inspection of engines. The cost of inspection does not increase with the speed. First cost of high-speed engine slight, increase of coal, and the cost due to delays of freight trains make up an increase of cost, but, in his opinion, not in the ratio of 2 to 1.

On motion of Mr. Leeds the committee was continued.

Most Satisfactory Method of Handling, Cleaning and Setting Boiler Tubes

REPORT OF COMMITTEE.

A circular letter was sent out; twenty-seven replies showed that the practice was general by which the tubes should be cut from both tube sheets with a power cutter, and when possible, removed through dry pipe hole. The tube ends remaining should be driven out with a pneumatic hammer and chisel. A heavier hammer will be required for the back tube sheet, the labor of chipping off beads can be dispensed with. Scale on tubes should be removed in a rumbler. Safe ends should be same thickness as original tube. The committee is of opinion that it is more economical to remove a defective tube occasionally, after having been set in a boiler, than to test each tube separately. Before setting tubs, copper ferrules should be rolled into the holes of the back tube sheet, and tubes driven into them. The back ends of tubes should be set with a Prosser expander, and after peening over, they should be rolled with a roller expander, and beaded with pneumatic hammer and beading tool. The front ends should be rolled with a roller expander.

The heating of tubes is accomplished with either coke, oil or anthracite coal. Either of these will produce a satisfactory heat, and the furnace should be arranged for heating as many tubes simultaneously as the man at the welding machine can handle without waiting for a heat.

The rumbler should be hexagonal, or, if of large diameter, octagonal. One section should be secured by key-bolts, that it may readily be removed, by means of a pneumatic lift. By giving the rumbler a half turn, all flues will be discharged at one operation upon an inclined plane, in order that they will roll clear of the machine.

The committee recommends the scrapping weight of tubes for boilers carrying 200 lbs. pressure as follows: 2-inch tubes, 1.65 lbs. per foot; 2 1-4 tubes, 1.85 lbs. per foot. From this it is obvious that a heavier tube will have a greater percentage of service metal.

No definite information was received regarding the merits with steel tubes as compared with charcoal-iron tubes. Experience with steel tubes seems to have been very limited. The opinion of the majority favored charcoal-iron tubes from the fact that they pitted less and would hold a better bead. The principal trouble, however, was in the welding of steel tubes to safe ends. The committee is not prepared to say how much of this is due to the inexperience of the operator or to the metal itself. A few suggestions, with illustration, follow for the expeditious and economical handling of tubes.

Mr. Brown said a No. 12 B. W. G. flue if safe ended with a No. 11 piece of tube it would stand more rolling.

Professor Hibbard spoke of a method which had been used in Great Britain instead of safe ending. It consisted in heating the tube in the centre and drawing it out to the required length after it had been cut. The walls of the tube were, of course, slightly reduced in thickness in the process.

Mr. Platt said steel tubes often pit; with drawn steel tubes satisfactorily.

Mr. Rhodes thought the minimum weight for a tube a good idea, as it gave some data relative to when a tube was so thin that it ought to come out. He spoke about the pitting of tubes, and asked for some information as to why it took place. He quoted European Railway Congress report, which said that in some waters there was an acid which formed globules and attacked the tubes in certain places, and not over the entire surface of the tube.

Mr. Platt said steel tubes often pit; with drawn steel tubes well annealed the best results were to be had, but pitting was always uncertain. It happened to some and not to others, and a definite reason was difficult to find. He thought it very injurious to pickle tubes—open hearth steel was much better than Bessemer for tubes.

Mr. Mackintosh, returning to the subject of tube setting, advocated the making of tube holes round, ferrules should be very short, the tube put in tight and the end upset with a hammer before rolling and beading.

Mr. Symington thought that effort should be directed toward the purification of the water, and not so much effort expended on how to set tubes.

Mr. Peck said a damper, or something placed over the top of the stack of an engine while standing in the round house, helped very much to prevent tubes leaking.

Mr. Fowler said he had been told by a motive power man not long ago that the way the latter had stopped leaks was to use some stay tubes.

Mr. Cross said that on the Canadian Pacific he had set tubes as described by Mr. Mackintosh, but in the bad water districts they had only stayed tight a short time. Zinc in the boilers helped to stop pitting. He said he had welded steel safe ends

on steel tubes without any trouble, and was doing it constantly with perfectly satisfactory results.

Mr. Tonge said he had reversed the usual process of tube setting with success. He rolled first and expanded the tubes afterward.

Mr. Roberts advocated tapering the flue holes in both sheets; he said he had got excellent results from so doing.

Reduction in Locomotive Fuel Consumption

REPORT OF COMMITTEE.

The committee sent out a circular of inquiry containing five questions, and received 26 replies. All the recommendations had merit, and if properly applied and operated would result in a reduction of coal consumption. Compounding appeared to be the most popular method for effecting economy of coal. A prominent locomotive builder said recently before one of the railway clubs that "After eliminating from the total number of locomotives built in our shops last year, foreign locomotives, switch engines, electric and compressed air locomotives, and various other specialties which we build, of road engines turned out for this country, seventy per cent. were compound." The committee is of the opinion that compounding has passed the questionable or experimental stage, and is now so generally recognized as one of the known methods for effecting a reduction in locomotive fuel consumption as not to warrant making a special feature of the report. The committee is also of opinion that the American Railway Master Mechanics' Association should be prepared, and ought to, in justice to itself, give its approval or condemnation of the compound locomotive, and so place itself squarely before the world as it does so.

Another method of coal economy is the use of feed water heaters. Using the exhaust steam from air pump and cylinders for heating feed water, is looked upon as being one of the most promising directions in which to effect a reduction in locomotive fuel consumption. This feature can be applied to existing engines, as well as new, with a moderate expense and but slight changes in existing arrangements.

The average yearly temperature of water as delivered to locomotive tenders is from 50 to 60 degrees Fahr. For every 12 degrees that the temperature of the feed water be raised by exhaust steam or waste gases before the water enters the boiler, there will be a saving of one per cent. in fuel. If by the means recommended an average temperature of 200 degrees for the feed water could be maintained, a saving of twelve per cent. in fuel would result.

The method recommended for accomplishing this is illustrated in Figs. 1 and 2, and consists of a steam pump adapted to handle hot water. The exhaust from the air pump, water pump, and a branch from the exhaust in front end, to be discharged into a partitioned portion of tank, designated as the hot-water tank.

The hot-water tank will have a capacity of 300 to 400 gallons of water. The partition will be water-tight, with the exception of a 1-2-inch space at the bottom, through which the water will maintain a constant level on both sides of the partition.

The exhaust from the cylinder saddles is conducted to the rear of the engine through a pipe, as shown in Fig. 1 at A; and the exhaust from the water and air pumps, as shown at B and C, joins this piping, which enters the bottom of the hot-water tank at D, and is then conducted up through the tank to the top and through a return bend back to within two inches of the bottom of tank, where it terminates in a bell-shaped open end through which the exhaust escapes into the water.

In the exhaust pipe and between the pumps and cylinders is placed a shut-off gate at E, to close the exhaust from the cylinders to tank if desired; also a gate at F where pump exhausts may be cut off from the tank and delivered to the front end.

The suction pipe for water pump is arranged to draw water from 4 inches below the surface of the water in hot-water tank, the suction end being supported by a float or buoy, as shown in Fig. 2 at G, which rises and falls with the level of water in the tank. The other end of adjustable pipe connects with a flexible joint at H, and forms a connection through tank valve case in bottom of tank to hose and pump.

In the top of the hot-water tank is a perforated pipe, I, which connects to the pipe running down through the coal space to the under side of tender frame. When the tank is full of water, this pipe acts as a skimmer to get rid of the oil coming in with the exhaust. It also acts as a safety valve for the escape of steam, should the water in the hot-water tank get to a higher temperature than 212 degrees, and thus prevent the hot water being forced out under the partition and into the cold water portion of tank.

The pump, hot-water tank and other appliances connected with same are on the right-hand side of engine and tender. The engine should be equipped with an injector large enough to supply the boiler when worked to its full capacity. The injector should be located on the right-hand side, but should take its water from the left-hand leg of tank. This arrangement should prevent the danger of trouble or delay on the road caused by the failure of the hot-water pump or any of the heating appliances, leaving the injector practically cold water to draw, should it be necessary to use same.

A still further economy may be obtained by the use of wide fireboxes and increased grate area. These factors in the problem of coal saving stand in such light, as already explained for compounding. It is not a new or untried feature. A grate of more than 35 square feet can hardly be obtained except with a wide firebox, and even this is in a box 42 inches wide or less, puts the front portion of the grate so far from the fire door as to require a special effort and considerable skill on the part of the fireman to keep the front grate covered. Any increase in the grate area ought to be done with a view to keeping all portions within reach of the average fireman. The committee were not prepared to recommend any definite proportion of grate to cylinder or heating service, or the relative width to length. An uneconomical feature of the large firebox and increased grate area is the heating of unnecessary excess of air in the gases. Careful firing will largely obviate this. Adjustable grates, whereby the air space could be enlarged or decreased at will if entirely reliable, might give more satisfactory results even than careful manipulation of dampers. The committee, however, does not know of any such device which has filled all the requirements of service.

The travelling engineer giving instruction to engineers and firemen; light and intermittent firing; preserving a level fire; the prevention of excess of air in gases; perfect combustion; checking over coal consumption each trip; and constant attention to details, are some of the recommendations of mem-

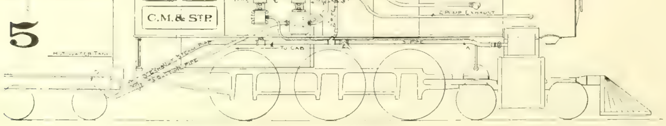
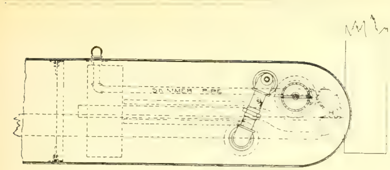


FIG 1
GENERAL ARRANGEMENT OF FEED WATER HEATER



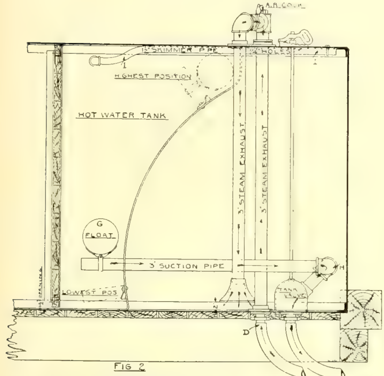


FIG 2

ARRG FOR EXHAUST STEAM IN TANK

bers as the most promising directions in which to effect a reduction in locomotive fuel consumption.

Reduction of cylinder clearance is a recommendation of one member, who has been experimenting with a patent valve motion on locomotives, and who is confident that existing clearance can be materially reduced.

The use of uniform grades of coal decreases the amount of alteration necessary to the draft appliances and so becomes a factor in economy.

The length of flues, superheating of steam, the Bates fire doors and automatic stokers are touched on in the report in several paragraphs, which indicate the bearing these various matters have upon coal saving. The committee does not offer an opinion on the economical length of flue, but is satisfied that the use of the air pump or a portion of the other exhausts for heating feed water is one of the most promising directions by which coal consumption can be lessened. All the methods, however, are worthy of consideration.

DISCUSSION.

The discussion on this report was opened by Mr. Rhodes, who said that the committee had practically summarized the whole report in its tabulated list of replies on page 2. The economy which has been effected of late years in the use of oil would lead one to suppose that a like saving could be effected in coal. He was so pleased with the report that he was going to send copies to his master mechanics and travelling engineers. He believed that it would pay any company to hire a specialist on coal economy.

Mr. Sanderson endorsed Mr. Rhodes' remarks, and thought that coal records should be kept of each individual man and that men educated in coal economy were better than devices for saving coal. He would carry on the work of educating the men even if the engines were pooled.

Mr. Humphries said eternal vigilance was the price of coal economy. He also thought the men should be encouraged to save coal.

Mr. Quereau was in favor of educational methods. Two years ago smokeless firing was almost unknown. When coming to this convention he had noticed that there was practically no smoke to be seen from the locomotives. Educational methods when persisted in formed one of the most promising directions in which to effect a reduction of coal consumption.

Mr. Forney said that when he was editing a paper he was accused of writing articles on car ventilation and coal economy whenever he had run out of a subject. He had been writing on coal economy for the past thirty years, and as this report was the climax and result of that work it was very interesting to him. There were thirty-nine methods tabulated by the committee, all of which would save between 3 and 4 per cent.; then, if all the methods were tried together it would result in the saving of about 113 per cent. (Laughter.)

Mr. Sinclair believed in keeping the men keyed up. He said he had entered upon a crusade in favor of smokeless firing some few years ago. The railways said, "Yes," but did not help the men. To get the best results a uniform grade of coal was necessary and engines must be kept in first-class condition.

Mr. Symington said that large nozzles produced less draught on the fire than smaller ones and consequently fuel was often less thoroughly burnt.

Mr. Miller said it was of the utmost importance to weigh accurately every pound of coal used and to let the men know exactly what they had received. When this was done the first step in economy had been taken. He was in favor of giving men who saved coal the preferred runs.

Professor Goss said that steam admitted to the clearing space was not lost, that small steam leaks on locomotives in the aggregate caused great loss of coal.

Practical Tonnage Rating

REPORT OF COMMITTEE.

The chief engineer of one of the Western lines has written the committee as follows:

"I am convinced that if some one would take sufficient time and pay enough attention to the matter, that it would not be very hard to get up a table that would be so accurate that every part of a road could be rated theoretically in the office from the track profile, and in such a manner that the results would be practically satisfactory."

Those who have attempted to establish ratings by means of actual tests upon the road know the many difficulties encountered and how seldom results can be satisfactorily duplicated. Variations in the weather or the steaming of the engine, the condition of the track and the train, and often the unexpected display of a danger signal throw so many obstacles in the way of successful tests that the "office method" is by many considered preferable.

A rule for the tractive force of locomotives is given. Train resistance curves, in accordance with *Engineering News* and the Baldwin Locomotive Works formulæ, were plotted and shown on an attached diagram. The effect of momentum is considered, also the effect of empty cars.

In the paragraph relating to the method of rating after some explanation of the diagrams, the report goes on with the illustration.

The engine selected as the standard can haul 1,750 tons up a 21-foot grade on a "dead pull." On a 34-foot grade with a dead pull, 1,250 tons would be the limit. However, on a hill of this grade 9,000 feet long and with a 35-mile an hour velocity at the foot, 1,450 tons can be taken up. If empties compose the train, 1,300 tons would be the allowance. By this means it is easy to rate the "standard engine" over the whole road. In order to simplify the rating of other classes, we have recourse to diagram, which is No. 8 in the report.

The diagram is drawn for other hypothetical engines to compare with the assumed engine, and tender weights being allowed, and it being further supposed that the boiler has about the same proportions relatively to the cylinder power.

Maximum Monthly Mileage

REPORT OF COMMITTEE.

It is very apparent that no set rules on this subject can be laid down covering varying conditions on mountain and level roads, on roads handling perishable freight and others handling

coal or iron. There are, however, underlying principles that apply to all conditions of service, and these we have endeavored to establish.

It is generally accepted that there is no limit to the monthly mileage it is advisable to make, consistent with proper maintenance of the power and sufficient rest for the enginemen.

It is frequently stated by practical railroad men that engines need a rest after each trip. This is not the case, as the boiler (which is the backbone or keystone of the whole machine) is more damaged by periodic contraction when cooled, and expansion when heated, than by continuing to do its duty in making steam.

By getting the maximum possible mileage out of power, fewer engines are needed and a great saving is made in outlay for equipment; or, expressed differently, a locomotive is good for a certain fixed number of ton miles and to get this return in ten years is better policy than to wait for twenty-five years. It is best to get the full service from our engines quickly so they can be replaced with more modern power. We therefore believe beyond question that the maximum mileage it is advisable to make is only limited by what is practicable.

The factors controlling and limiting the mileage are many, and vary on different lines. They may be grouped into three general classes with subdivisions, as follows:

Length of divisions. Character of grades and curves. Number of stops necessary. Schedules. Number of trains run. Variation in traffic. Condition of equipment. System of crews. Round house practice. System of running repairs. Adherence to standards.

The committee sent out a circular asking for information on these lines, and are gratified to state that our statistics are based on the best practice as reported by thirty separate roads. These statistics are too voluminous to give in detail.

The variety of service on each separate division of each line makes a separate and local problem of the method of crewing not only on each division but on separate runs on the same division.

The statements below give the average mileage for different methods of crewing on different length divisions as reported by thirty separate roads, equal value being given to each line regardless of the number of engines in service.

Special attention is called to the average mileage on all divisions in both passenger and freight service, as reported by thirty separate roads and representing their best practice. It will be noted that the mileage increased regularly in the following order of crewing:

1. Single. 2. Single, with extra men. 3. Pooled. 4. Double. 5. Double, with extra men.

There are, of course, special cases where the order is changed, but the average results only can be considered, and there are several things to consider in connection with our methods of crewing.

1. Monthly engine mileage obtained. 2. Variation in traffic. 3. Proper maintenance of the engines. 4. A proper spirit among the runners.

The only way in the control of the machinery department to increase an engine's mileage is to reduce the necessary lay-over at terminals to a minimum.

An average of replies from thirty separate lines gives 4,650 miles in passenger service and 3,550 miles in freight service as the monthly maximum it is considered enginemen should be allowed to make. On the other hand, an average of the same replies gives 4,250 miles in passenger service and 3,330 miles in freight service as the monthly mileage men are satisfied to make. Under normal conditions it would then seem that two men by continuous running can make regularly almost as great a monthly mileage as is practicable for one engine.

DISCUSSION.

In discussing this report Mr. Quereau said that theoretical tonnage ratings had usually to be revised by practical tests. Cars of 100,000 lbs. capacity required less drawbar pull per ton than a 40,000 lb. or 50,000 lb. capacity car.

Mr. Seeley said that the fact of this more easy drawbar pull per ton, spoken of by the previous speaker, should not be made the basis of heavy tonnage ratings for engines, as draw-gear would suffer.

Mr. Gaines said that he thought the effect of tonnage rating on draw-gear should not enter into this calculation. Draw-gear and its ability to stand hard service should be dealt with on its own merits.

Mr. Rhodes thought that monthly mileage was reduced very much by the way trains were laid out on sidings by the transportation department, and that motive power people ought not to be afraid to speak out plainly on this matter.

Mr. Joughins said that bad coal which clinkers easily and gives a great deal of trouble to engineer and fireman from the start, undoubtedly stands in the way of good monthly mileage.

Mr. Quereau, speaking of engine failures as a factor in decreasing monthly mileage, said that he understood that engine failures were not more than twelve per cent.—he might even say ten per cent.—of total train delays. Pooling, he held, increased monthly mileage because of its even distribution of pay to the men, its even greater distribution of rest. Ordinarily all a man's rest was bunched at home in his desire to follow his engine. Under the pooling system rest was evenly distributed at each end.

Mr. Deems objected to the recommendation of the committee which suggested "That the existing methods be overhauled so that necessary routine work will not cause engines to lose their turns." He held that requisite work should be done without reference to the engineer's turn. Under the pooling system a man was sure of his turn, and that of the engine did not matter.

Method of Unloading Locomotive Coal

REPORT OF COMMITTEE.

The committee to which was assigned the subject "What is the Most Approved Method for Unloading Locomotive Coal Prior to Being Unloaded on the Tank," reported as follows:

To get the views of the different members, and to present illustrations as well as data bearing on the modern plants of this kind, the following circular of inquiry was sent out:

1. What class or design of coal chutes is in use on your line? If more than one, which do you consider the most effective and economical?

2. Does your most approved design require the use of hopper-bottom cars?

3. Please state what advantages you derive from the approved design over others?

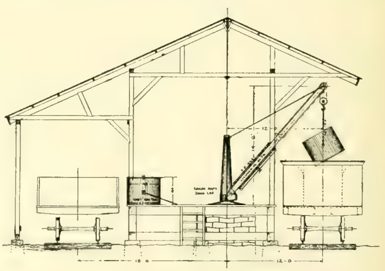
4. What does it cost per ton of coal delivered on the tank with your most approved method?

5. Does this design admit of weighing coal before being placed on the tender?

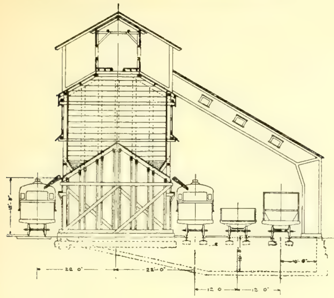
6. What is the capacity per hour of your most improved design, and can this capacity be increased as desired, and how many men are required to operate it?

7. What ground space does this design require? Can it be used for single or double track?

To which the committee received replies from thirty members, accompanied by blue prints and information bearing on the questions. Lack of modern plants is probably the reason for not receiving a greater number of replies. Those received cover a great variety of modern plants, nearly all of which have some special features particularly adapted to locations and conditions where they are used.



C. C. C. & ST. L. R'Y STANDARD COALING CRANE.

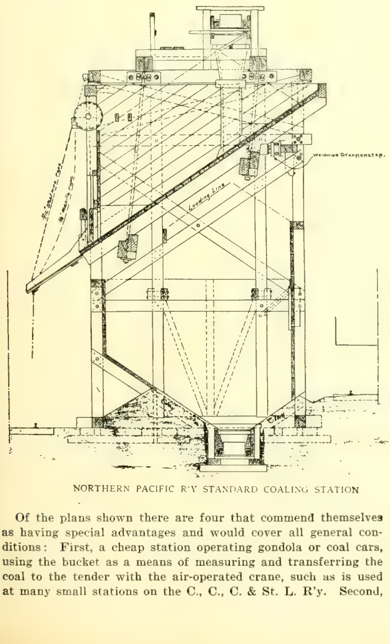


ERIE POWER COALING PLANT, PORT JERVIS,

The committee presented a series of cuts that give a general idea of the different arrangements.

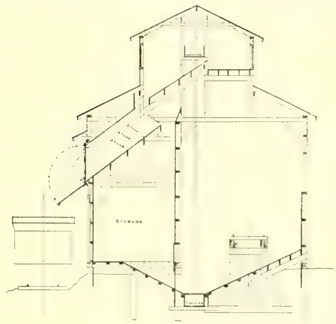
The replies received from a number of important railroads are given. The report goes on to say:

An item of importance to many roads is the ability to weigh or measure the coal to individual engines. There are four systems now in use: the first, to fill the ordinary coaling bucket which is handled on to the tender by hand or air operated crane. Second, by filling the pocket to a given mark or making the pocket of a given capacity. Third, by the balance pocket operating a dynamometer, and fourth, by having a pocket supported on scales.



NORTHERN PACIFIC R'Y STANDARD COALING STATION

Of the plans shown there are four that commend themselves as having special advantages and would cover all general conditions: First, a cheap station operating gondola or coal cars, using the bucket as a means of measuring and transferring the coal to the tender with the air-operated crane, such as is used at many small stations on the C., C., C. & St. L. R'y. Second, the single or double pocket of large capacity, delivering coal directly to the tender or from a measured car of small capacity as shown by a station on the Erie R. R. Third, the large pocket, the total contents of which is weighed by the dynamometer, as largely used on the Northern Pacific R. R. Fourth, the measured pocket with storage underneath and its automatic adjustment, as used on the Michigan Central R. R. This arrangement seems an ideal one, as it admits of any extension or capacity; can be operated by drop bottom, side dump, gondola or box cars; automatically weighs the coal to measure and provides large storage capacity.



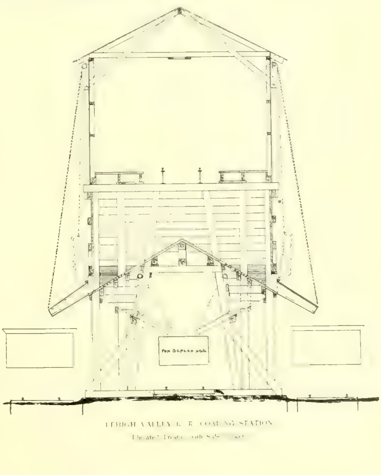
MICHIGAN CENTRAL R. R. COALING STATION, JACKSON JUNCTION, MICH.

Elevated Track, with Pocket Chutes.

There are many magnificent plants in operation, but as the principle is similar to what has already been referred to, except the Plainfield plant of the Lehigh Valley R. R. Co., which is designed to coal the tender without detaching the engine from the train, you are respectfully referred to the cuts and to the reports of the roads operating them.

DISCUSSION.

In commenting on this report Mr. Brown insisted that to actually weigh the coal delivered on a tender was a matter of vital importance.



LEHIGH VALLEY R. R. COALING STATION

Elevated Trestle, with Side [illegible]

Mr. Delano said that estimating coal on tenders was purely a matter of guesswork, that he had known an error of 1,500 lbs. in the delivery of three or four tons. The method adopted to overcome this difficulty on his road, he said, was to place a track scale 20 feet long at each end of the coal chute, by which means the incoming light tender was weighed, and weighed again after receiving coal as it passed to the roundhouse without the engine moving in any but the one direction; he believed that this method was cheaper than that given in the report.

Mr. Christopher said that the use of a dynamometer in connection with coal buckets confined the error within very narrow limits. The total given by the sum of all the buckets checked to perhaps half a ton in the car.

Mr. Mitchell, being called upon by the president, said that on his road they burned a mixture of seventy per cent. anthracite and thirty per cent. bituminous in a great many of their engines. The mixture was very cheap, the bituminous coal being used in order that it might coke and so prevent the fine coal going through the grate.

Proposed Joint Library in Connection with the M. C. B. Association

BY A. M. WAITT.

On behalf of the Master Mechanics' Association, and after a conference with the M. C. B. Association committee, the result of the joint deliberations was that it was not deemed expedient at the present time to establish a joint library. First, owing to the expense involved; second, in all large cities excellent reference libraries are maintained, whose facilities are available to all; third, there are few of our members who would be likely to avail themselves of such a library if established.

[Mr. J. T. Chamberlain signed a similar report on behalf of the Master Car Builders' Association.—EDS. RAILROAD DIGEST.]

An "Up-to-Date" Round House

REPORT OF COMMITTEE.

The modern, "up-to-date" round house should not be less than 80 feet in the clear. Doors should have a minimum height and minimum width of 16 and 12 feet in the clear, respectively. The upper portion of the doors should let as much light in as can be obtained without interfering with the strength of the door. Round houses 80 feet in the clear cannot get enough light from the outer and inner circle of windows alone. We must arrange for additional light, without skylights, as shown in Figs. 1 and 2.

Engines should head in, because there is more room near the outer circle of the house, and because of the increased light which can be obtained. In the North, with its cold weather, separate smokejacks are necessary, while in the South, continuous ventilators (Fig. 1) give good results. Ventilators are recommended, one to every two stalls, in any round house, and these may be closed up in winter.

Pits should be 60 feet long, from 2 feet 6 to 3 feet deep, according to circumstances. The pit floor should be a convex surface, the centre being about 3 inches higher than the sides. Brick on edge on a concrete bed is the best floor, crushed stone and sand makes a cheaper floor.

Pit drainage is best accomplished by having the engine pits extend into an annular pit, which is placed just inside the main doors, this pit being made lower than the engine pits. This pit should be deeper in the centre than at the sides. Water and steam pipes may be run along its walls. The covers for this pit should be easily removable for the cleaning and flushing out of the pit.

Rails may be supported on short ties extending to the edge of the pit wall, about 2 feet long, the space between them being filled with concrete. Rails may also be supported on a longitudinal timber about 12x12 inches. This is the more expensive form of construction and is apt to deteriorate more rapidly than the other. In either case provision must be made for raising the engines by jacks.

The turn-table pit should be drained by a tile drain, and be

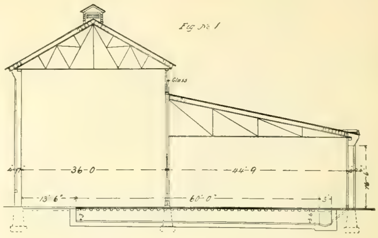


Fig. No. 1

paved with vitrified brick or cemented. The round house floor ought also to be of vitrified brick laid on edge in sand. The committee recommended a concrete bottom, then a layer of sand, and blow-off pipes be placed in the annular pit, all others overhead. Steam for stationary boiler should be at 125 lbs. pressure, and conducted through the house in 1 1-2-inch pipes. Compressed air should be supplied at 100 lbs. pressure.

The most modern method of heating is by hot air and forced blast. In the matter of lighting, one arc lamp should be placed over the centre of the turn-table, and not less than three 16-candle power incandescent lamps should be placed between the pits; one about opposite the cylinders, one about opposite the cab, and one about the centre of the tank. There should be portable lamps, also.

The committee agreed that telescope smoke jacks made to fit the stack and provided with a damper should be used. The jack should also be capable of a certain amount of swing parallel to the track, in case engine was moved slightly with jack down. A lever to raise and lower is preferable to cable and sheaves.

Every modern round house should have a drop pit for removing driving wheels extending across two tracks, also one close to the outer wall for truck wheels. Jacks are preferably worked by power, hydraulic power being, perhaps, preferable.

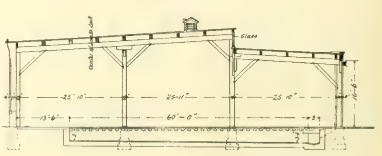
In answers to inquiries regarding turn-tables the majority favored structural steel tables, designed so that all parts are easily accessible, and should be frequently painted. Seventy feet long, at least, and latched at both ends. Decking 15 feet wide should be provided. Electric power for moving tables is recommended. If power is used a foot-brake should be provided which answers instead of latching, and avoids reversal of current to stop the table.

Work benches against the wall, one for each stall, should be provided and also several portable benches. A tool-room should also be put in. The machine tools should be placed in a convenient annex and suitable portable air tools should be also in service.

Water tank or standpipe should be located so as to be available for outgoing and incoming engines.

For handling ashes and cinders, the cheapest arrangement is a depressed track between two tracks, the depressed track to be deep enough so that the ashes can be hoed from the cleaning floor directly into the ash cars, and the double ash tracks being merely for the purpose of having engines desiring quick treatment pass around those which may be a longer time on the pit. If, however, there is not sufficient track room for this arrangement, some mechanical device for handling the ashes will have to be resorted to, provided the traffic warrants the expense.

Fig. No. 2



Considering the cost of fuel, labor and maintenance, the committee was of the opinion that the steam coil and dryer is the most economical. Answers to questions asked by committee were almost unanimously in favor of the elevated sand bin, the sand being elevated by compressed air or mechanical means.

For washing out locomotive boilers, the committee recommended that 100 pounds pressure per square inch be used, and when desirable hot water can be used advantageously.

It was thought desirable by the committee that each engine should carry its own record as to wash-out, stay-bolt inspection, etc., and this can be most conveniently done by means of a card which is always visible in the cab of the locomotive, and can be turned in at the end of each month for file at the Master Mechanic's office. This should not, however, be construed as displacing the usual round house records.

It is the opinion of the committee that stay-bolts should be tested once a month. The hammer test is satisfactory when bolts are completely broken through. When only partially broken it does not tell the story. Where tell-tale holes are drilled, or hollow stay-bolts used, a careful inspection of the tell-tale hole for the presence of lime is considered most satisfactory. It is also desirable that a record should be kept of all such tests. In making the hammer test, about 40 or 50 pounds of steam or air pressure should be used in boiler to separate the ends of the broken bolts.

The consensus of opinion relative to the form used for engineer's report covering running repairs on locomotives is in favor of separate slips, the engineer carrying a book of same in his possession, and filing the work slip at each end of his run, and the same information carefully written on the stub. In large houses where an engine inspector is employed, he should fill out the same kind of slip as the engineer. This will enable the foreman to have the check on both the engineer and inspector.

At round houses on main lines where work is heavy, it is the general practice to distribute the work to the specialists who have been selected to do certain kinds of work.

The opinion was held almost unanimously in favor of machinists filling the position of round house foremen. A few believe that engineers who are also machinists would make good men. The committee was of the opinion that it is very necessary that a round house foreman should have had practical experience as a machinist, and that if he could have some experience as either a locomotive fireman or an engineer, it would make him a better round house foreman than he could be without such experience, as he would then know the conditions that exist on the road, and could therefore do more intelligent work.

[The committee recommended that telescope drop jacks be given some swing parallel to track, so that probably, moving an engine slightly by mistake or otherwise, will not injure the mechanism of the jack. If mistakes are to be provided for, it is sometimes useful to lay half a dozen ties close together, side by side, where the main track enters the table. When a wheel drops between the rails, it happens at this point perhaps more often than at any other, and a track supported on ties placed solid, often means "time" in the process of rerailing.—Eds. Railroad Digest.]

DISCUSSION.

Mr. Rhodes said that an up-to-date round house ought not to be less than eighty feet long and that such a round house, when covered with a flat roof, was difficult to light properly.

Mr. Sanderson said that the depth of the pits advocated in the report was, in his opinion, slightly more than was necessary. He held that the timbers which carried the rails should be creosoted. That smoke jacks should be made of cast-iron.

Professor Hibbard, referring to the want of light in round houses, thought that ribbed glass whose prismatic property diffused the light, might be used with advantage. He thought that the exhaust steam if used for heating purposes would be very economical.

Mr. Rosing said that economy might be effected if when an engine was blown off the waste steam was conducted to a hot well, and the hot water so produced might be used for washing out purposes and for filling up. The temperature of one hundred and ten degrees might easily be obtained.

Mr. Quereau agreed with the report that engines should head in and not back in. When headed in there was less liability to break down the wall of the roundhouse, also when tender had to be disconnected it could be run out of the way without using up valuable space in the roundhouse. He was in favor of drop smokejacks, because when used the blower was not necessary in raising steam. He did not think that the use of hot water for washing out amounted to very much, because in order to be of real service we ought to add two hundred degrees to the water used for washing, whereas usual practice did not add much over fifty degrees, and that addition of temperature he did not think would prevent contraction of the plates. Water at high temperature was too hot for men to handle. He considered the greatest benefit was secured by filling a boiler with hot water and not forcing the fire. He believed most harm was done by forcing the fire. He suggested a board for use in a roundhouse, which, in addition to other information, should have a column to mark a crew as "called" as soon as such was the case. A similar column might be set apart for the use of the machinists in which to indicate that work required had been done. He said that when boiler work had to be done the boiler maker or flue borer, as the case might be, should make a chalk circle on the inside of the fire hole door when he was finished with the engine. This would indicate to the fire lighter that a fire might be put in. On doing so the latter was supposed to draw a horizontal line through the circle on the fire door, and when steam was raised a circle drawn on the roundhouse board indicated the fact. Another indication which might be shown on the board by the hostler was the location of the engine in the roundhouse.

Mr. Deems said he had known a floor made of vitrified brick in a machine shop to become so slippery by oil dropping upon it that men refused to work, saying it was equivalent to standing on ice.

Mr. Humphrey objected to telescope jacks, and considered that stationary wooden ones coated with paint which soon became covered with soot were perfectly fireproof.

Mr. Delano pointed out that nothing had been said in the report about paint or whitewash for the walls. He believed that roundhouses should be whitewashed if possible spring and fall. This practise would add very much to the light and cleanliness of the house. The use of white glazed brick, or nearly white, on the inside of the roundhouse wall would accomplish much in securing light. With regard to ventilators, he was of opinion that air blew down into the shop more often than smoke and gas escaped. He advocated placing a globe valve in whistle pipe or dome and steam blown off through suitable connection without being allowed to escape in the roundhouse. In cooling down a boiler cold water, if introduced through the check and hot water drawn off through the blow-off cock, required about an hour and forty minutes. If, however, cold water entered at the check and hot water escaped from dome or valve in whistle pipe, the time for cooling down would be reduced to forty minutes. The hot water so obtained could be used for washing out and filling up.

Mr. Marshall said that a five-inch pipe over the dome for carrying steam out of the roundhouse was effective at first, while the velocity of blow-off steam was great; later on, when the steam pressure fell, it came out more slowly, and should then be conveyed to a hot well.

Mr. West said an injector for wash-out purposes would supply all the hot water that was necessary and that if water as hot as could be handled by a washer-out did not do much good, it certainly did no harm, but that filling up with hot water was a decided economy.

Mr. Minshall thought a step at each end of the pit so that men could easily get in and out under an engine would be a decided advantage.

Mr. Bentley explained the great satisfaction he had had with a turntable motor, even when the turntable pit was full of snow and ice. He thought cast iron drop jacks not very satisfactory. He advocated whitewashing spring and fall. In the fall, when the short days begun and light was needed, the walls which had been whitewashed in the spring would be dirty and a new coat of whitewash would help in lighting up the roundhouse.

The committee was not discharged, and is expected to make a further report next year.

The election of officers was proceeded with by the chair appointing Messrs. Whyte and Fowler tellers.

The tellers reported 46 ballots cast for president, as follows: Mr. Waitt, 42; Mr. Lewis, 2; Mr. West, 1; Mr. Barr, 1. On motion, the election was made unanimous.

President Morris said: "Mr. Waitt, I believe that the Association and yourself are to be congratulated. I will express my thanks to the Association for its kindness to me during my incumbency of the presidency, and offering my assistance to the new president, I will deliver the gavel of authority to you, sir." (Applause.)

Mr. Waitt said: "Mr. Morris and Gentlemen of the Association: I cannot but feel highly gratified at the honor you have conferred upon me in electing me to the presidency of this Asssociation, which has a record behind it that any organization can well be proud of; with a list of past presidents we look upon with a feeling of pride, and congratulate ourselves that we have had such a long line of able men. I feel doubly honored in being considered as worthy to follow in their footsteps, and so far as it is possible, I assure you, it will be my utmost endeavor to do all I can during the coming year to contribute toward the success of the American Railway Master Mechanics' Association, and with your co-operation we will try to continue the good work that has been carried on by the Association in the past. Again, I thank you heartily." (Applause.)

The tellers reported 44 ballots cast for first vice-president, as follows: Mr. Barr, 34; Mr. West, 4; Mr. Lewis, 4; Mr. Delano, 1. On motion the election was made unanimous.

The tellers reported 46 ballots cast for second vice-president, as follows: Mr. West, 41; Mr. Lewis, 4; Mr. Delano, 1. On motion the election was made unanimous.

Mr. West said: "Gentlemen, I thank you for this evidence of your further confidence in me. I appreciate it fully. I will do all in my power to assist our worthy president and do everything I can to advance the interests of this Association." (Applause.)

The tellers reported 57 ballots cast for third vice-president, as follows: Mr. Delano, 29; Mr. Lewis, 22; Mr. Rosing, 1; Mr. Peck, 1; Mr. Mendenhall, 1.

Mr. Lewis then rose and said: "Mr President and Gentlemen: I want to congratulate the Association on the election of Mr. Delano as third vice-president. If I had the power to regulate the vote, I would have gladly decided it in that way. I therefore move that the election of Mr. Delano as third vice-president be made unanimous." The motion was carried.

The meeting then adjourned.

THE MASTER CAR BUILDERS' ASSOCIATION

Proceedings of the Thirty-fifth Annual Convention, June, 1901

The Master Car Builders' Convention opened at 10 o'clock on Monday, June 24th, 1901, with President J. T. Chamberlain in the chair. After the ex-presidents of the association had been invited to take seats on the platform, the Rev. Delos Jump, D.D., pastor of the First Methodist Episcopal Church of Saratoga, offered prayer.

A letter was read from Governor Odell, regretting his inability to be present, and expressing his admiration for the association and its work. Mr. Knapp, as president of the village, welcomed the association to Saratoga. Mr. A. M. Waitt made a very happy address in thanking the president of the village for the full and open welcome which had been extended to the association and in reply to the letter of his excellency, the Governor of New York.

Mr. Chamberlain then delivered his presidential address, of which the following is a resume:

PRESIDENT CHAMBERLAIN'S ADDRESS.

President Chamberlain opened his address by telling of the pleasure it gave him to give his initial speech as president of the M. C. B. A., and welcomed all present to the thirty-fifth annual convention. He spoke of the development of the country's business since the last convention, and attributed it in a large degree to the railroads. The wail sent up by the foreign railroad mechanics in regard to the durability of the American locomotive is not founded on reality, and its best answer will be in the increased exportation of American railway supplies. The President then thanked the various committees for their faithful work, and also paid a compliment to the arbitration committee. He recommended that the committee on Draft Gear be continued until another year. The attention of the members was directed to the various committee reports, especially to the one on "Laboratory Tests of Brake Shoes." The number of members increased 20 during the past year, making a total membership of 483. The demand for larger capacity cars is not diminishing, and many roads are now constructing 100,000 pounds capacity cars. The railroad companies should promptly repair all defects noticed by the car inspector, not only as regards the coupler and all its parts, but also the air brake and other safety appliances of the car.

In conclusion, the President stated that as he lived in Boston and the official office being in Chicago, it handicapped him considerably, and made him feel as if he could not properly fill the position of his office. Therefore he hoped that the members would take such action as would lead to the selection of his successor during the convention.

A letter was read from Mr. Schroyer, in which it was pointed out that the inspectors for the Interstate Commerce Commission were insisting that the absence of the cotter-pin in the knuckle pin was a defect which it was thought brought it within the operation of the safety appliance law.

On motion by Mr. A. M. Waitt the Association placed itself on record that "the cotter-pin should not be considered a necessary safety device in connection with the knuckle pin."

Rules of Interchange

The changes made in the M. C. B. Rules of Interchange have been too numerous to publish in detail. As the matter is not exactly of universal interest, the RAILROAD DIGEST has decided to publish the changes in rules and prices in a neat little pamphlet, a copy of which will be mailed to any of our readers on application.

Supervision of Standards and Recommended Practice of the Association

REPORT OF COMMITTEE.

It is recommended that the detail of the journal box for 4¼ by 8 inch journal be changed so as to avoid all danger of the journal striking the wall of the box at the rear. The simplest way this can be done is to cut out the inner dust guard wall at the top entirely. The same change in the 5 by 9 journal box is recommended. Axle "B," with journals 4¼ by 8 inches. The committee recommended that this standard be made to conform to whatever alterations the Committee on Chemical Composition of All Steel Car Axles may recommend. Axle "C," with 5 by 9 journals, should have the wheel fit increased from 6⅜ to 6½ inches. Axle "D," with journal 5½ by 10 inches. It is recommended that the wheel fit be increased from 6⅞ inches to 7 inches. These changes are suggested on account of the recommendation of the Committee on Steel Axles, and it seems desirable that the diameter of the wheel seat when axles are new should be ¼ inch more than the minimum diameter allowable, so that the axle will be capable of being refitted with wheels at least three times.

RECOMMENDED PRACTICE.

It is recommended that under the heading, "Instructions for Cleaning Cylinders and Triple Valves," the stencils provided

be abbreviated to "Cyl. Cl'd." and "Trip. Cl'd." Also that the paragraph on page 373 of the M. C. B. proceedings on "Graduating Springs" be made to read in accordance with the present Westinghouse standard.

The committee also recommended the following items be submitted to letter ballot for adoption as standard:

A. Arch bars and column bolt for 80,000 pounds capacity car. Page 346, sheet M. C. B. A.

B. Adjusting height of couplers. Page 349.

C. Stenciling cars, page 349.

D. Passenger car pedestal and journal box for journals 4¼ by 8 inches. Page 355, M. C. B. sheets G and H.

In connection with this change to standard it is recommended that title of present standard pedestal, M. C. B. sheet 10, be changed to read "Standard Pedestal for Journals 3¾ by 7 inches."

In connection with the recommended practice for loading poles, logs and bars on cars, and springs for freight car trucks, it is suggested that special committees were assigned to report on these subjects, and action taken on their reports may make it necessary to modify the recommended practice.

It is very desirable that in connection with M. C. B. standard axles that there be absolute uniformity in practice, and it is believed that it is desirable for a special committee to further consider the subject of standard axles and specifications for same, incorporating in the specifications not only the chemical requirements, and the physical tests, but also giving proper reasonable limits of variation in weight and dimensions from standard sizes. Such additions to the specifications would seem to make them more complete and practical, and would enable manufacturers to carry stocks of M. C. B. standard axles made to M. C. B. specifications with safety, whereas under the present practice there is yet a great deal of variation in the M. C. B standard axles being made for different roads.

In conclusion the committee would suggest that recommendations 1, 2, 3, 5, 6, 7 and 8 be submitted to letter ballot for adoption, and that a committee be assigned to consider the items mentioned in the last paragraph of the report which have not yet been included in axle specifications.

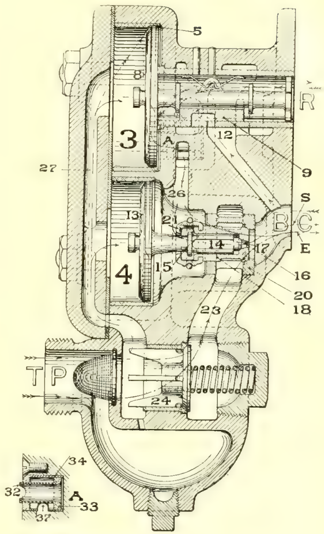
Following this report, Mr. Rhodes asked if the bottom of the standard box was round or flat. Mr. Waitt replied that the style of box bottom was not given in M. C. B. standards. Mr. Rhodes said that the round bottom had been found to facilitate the movement of waste in the box in the direction of the motion of the journal, and when waste worked up in this way it frequently caused a hot box; something was required to keep the waste from moving. Boxes, therefore, often did not want more oil, but they required attention.

Triple Valve Tests

REPORT OF COMMITTEE.

After giving a number of tests in detail, the committee summarizes its reports in some conclusions as follows:

It will be observed that while, under a strict accounting, the Hibbard valve failed in four of the twelve tests it was subjected to, there was but one class of failure, excluding the minor test of time charging reservoir to 70 pounds, namely, the *time record*, and that in the No. 2 test this failure only amounted to a small fraction of a second, so small indeed that it had to be measured by electrical recording apparatus, the combination of stop watch, gauge and observer's eye not being quick enough to determine the differences. The advantage of the disk test for measuring the range of service application and the range of emergency application was well illustrated. No. 6 test was a surprise and disappointment to all those who had witnessed the fine performance of the valve in all other respects. The inventors of the valve feel confident they can reproportion the parts so that emergency action will follow the service action within the 3-64 limit called for in test No. 6. When this is accomplished it is believed that the Hibbard valve will easily meet all the requirements of the Association's code. The committee feels that it cannot commend too highly the action of the owners of the Hibbard valve in submitting their device for criticism and test before putting them on the freight cars of the country.



THE HIBBARD TRIPLE VALVE.

A summary of the tests is as follows:

Test No. 1.—To determine power of service brake, meets requirements. Test No. 2.—Development of power and measurement of time in emergency service, fails in the 55 lbs. pressure requirement in 3½ seconds by .196 of a second in the first series of three tests, and by .076 of a second in the second series of three tests. Test No. 3.—Jumping test, meets requirements as far as jumping is concerned, but fails in the time requirement on the fiftieth car. Test No. 4.—(*a*) Graduating test, meets requirement. (*b*) Graduating test, meets requirement. Test No. 5.—Disk test, service, meets requirement. Test No. 6.—Disk test, emergency, fails in requirement. Test No. 7. Holding test, service, meets requirement. Test No. 8.—Release test, meets requirement. Test No. 9.—Time charging reservoir, failed in requirement. Test No. 10.—Service followed by quick action, meets requirement as far as quick action is concerned, but failed in the time requirement. Test No. 11.—A extra, mixed train test of application No. 1, results entirely satisfactory. Test No. 11.—B extra, mixed train test of application No. 2, results entirely satisfactory, including time requirement.

There was practically no discussion on this report. Mr. Rhodes in introducing the report referred particularly to what he called "disc tests" to determine sensitiveness of the service valve. He said in part:

Three valves selected at random were taken for this test, and each tried separately. They were tested on a train pipe representing a locomotive and one car, the engine and tender brake being cut out.

A train pipe pressure of 70 pounds having been secured, the air was discharged as rapidly as it could through an opening in the engineer's valve of two sixty-fourths to three sixty-fourths (2-64 to 3-64) inch diameter. Under this condition the service action must take place and continue to take place without any appearance of quick action until the disk had been enlarged up to and including a 10-64 opening. The object of this test is to insure the working of triples in "service" with practically the same reduction of air.

Brake Shoe Tests

REPORT OF COMMITTEE.

At the last convention the committee was instructed, first, to make tests of any brake shoes that might be submitted to it by any railroad company belonging to the Association; second, to present a specification for adoption as standard by the Association which would cover the essential and most desirable features of a satisfactory brake shoe for steam railway purposes.

In compliance with the above, the committee, through the secretary of the Association, gave due notice to all concerned that it would receive brake shoes for test. Arrangements were also made with Professor Goss whereby, under the direction of Professor Smart, the work of testing would be conducted in a manner exactly similar to that followed in 1896, it having been demonstrated by the committee and the university authorities who have used the machine frequently that the original results obtained by the committee were both accurate and reliable, and as representative as possible of actual conditions.

The shoes submitted for test and tested were as follows: Lappin, Sargent U (broke), Streeter, Corning, Herron, Cardwell, Ideal, Cardwell, Sargent U, Composite, Diamond S, Diamond S.

Mr. Bush stated that the Lappin and Cardwell shoes had been presented by the committee itself for the purposes of test.

SPECIFICATIONS.

Shoes when tested on the Master Car Builders' testing machine in effecting stops from an initial speed of forty miles an hour shall develop upon a cast-iron chilled wheel, or upon a steel-tired wheel, a mean coefficient of friction of not less than:

25 per cent. when the brake shoe pressure is 2,808 pounds.

22½ per cent. when the brake shoe pressure is 4,152 pounds.

20 per cent. when the brake shoe pressure is 6,840 pounds.

The rise in the value of the coefficent of friction at the end of the stop shall be within such limits that the value of the coefficient of friction for a point 15 feet from the end of the stop will not exceed the mean coefficient of friction by more than 7 per cent.

This specification is based upon the results obtained in the case of ordinary or reasonably hard cast iron such as the "B" shoe of the original tests, and a good quality of composite shoe. It will be noticed that this specification does not place a maximum limit on the coefficient of friction. The committee has omitted this for the reason that it believes it is the desire of the Asssociation to encourage high frictional qualities as well as satisfactory wear. It is found that high and uniform frictional qualities are desirable in that it makes it possible to perform the operation of braking with an expenditure of less work and with lighter and less expensive brake gear. The committee believes that it is undesirable to use a brake shoe that gives a high coefficient of friction at or near the end of the stop, as this results in sliding the wheels, and in recommending that the coefficient of friction for a point 15 feet from the end of the stop should not exceed the mean coefficient of friction by more than 7 per cent., it was intended to exclude only the worst of those that have been presented for test.

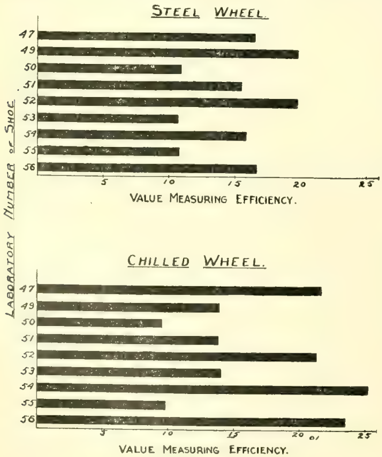


Diagram C.

Shoe.	Lab. Number.	Wheel	Coeff. of Friction in Per Cent.	
			Mean—A.	Final—B.
Lappin	47	Steel	20.45	28.37
		Chilled	24.87	31.26
Streeter	49	Steel	21.99	26.55
		Chilled	16.51	21.76
Corning	50	Steel	14.22	20.88
		Chilled	13.69	22.00
Herron	51	Steel	18.98	26.03
		Chilled	17.80	25.66
Cardwell	52	Steel	22.91	29.29
		Chilled	24.42	30.64
Ideal	53	Steel	14.13	21.05
		Chilled	17.46	24.36
Cardwell	54	Steel	18.72	24.50
		Chilled	27.29	31.47
Sargent U	55	Steel	16.78	28.74
		Chilled	16.16	28.85
Composite	56	Steel	20.66	28.67
		Chilled	25.86	30.41
Diamond S	..	Steel	.....	.....
		Chilled	.....	.....
Diamond S	..	Steel	.....	.....
		Chilled	.....	.....

Finally, it may be stated that as development in the matter of brake shoes continues, it may be found desirable to make some modification in the specification proposed, but for the conditions existing to-day the committee believes that it is fair and reasonable, and urges all members to pay some heed to the frictional qualities of brake shoes that they may use.

The committee desires to acknowledge the exceedingly valuable assistance rendered by Professors Goss and Smart and the students working under their direction. It will be seen from Professor Smart's notes that the work has been most carefully done. The committee feels that the Association is to be congratulated upon having its testing machine in the hands of such earnest and capable men.

DISCUSSION.

Mr. Sanderson opened the discussion by stating that the three ways in which brake action showed itself was either in wear of shoe, wear of wheel, or in the production of heat. He thought a more efficient shoe was used on steel tired wheels than on cast, and it happened that the former were generally under passenger equipment. He also said that railways were not uniformly using the best shoe for stopping trains. He advised the Association to give up a "long-life" shoe for a more efficient train-stopper.

Mr. Rhodes said the soft cast shoe was the best kind, but that it wore out so fast that the committee in framing its specification had in mind the next best shoe; *viz.*, the hard-cast shoe. He said that in 1896 very little attention had been paid during tests to the shoes—some were soft and some were hard; but now the difference between durable shoes and those intended to stop trains was fully understood. He intended to take this report home and have it introduced on his road among the foremen, or at a foreman's club, and have the whole question fully discussed. There were cases where roads which had cars in interchange equipped them with a durable shoe, and as these roads did not care about the retarding power of the shoe or the efficiency of brake action on their neighbor's line, it made the use of such shoes very undesirable for the road handling them at the time.

Mr. Bush pointed out that the soft shoe, though undeniably good, would necessitate frequent renewals and slack adjustment on long runs.

On motion, the specification recommended by the committee was ordered to be referred to letter ballot for adoption as a standard.

Tests of M. C. B. Couplers

REPORT OF COMMITTEE.

The modifications to which the committee particularly calls attention are: First, the requirements of the specifications have been made uniform foı couplers, whether cast steel or malleable iron; second, the abandonment of the separate knuckle test.

An extended experience with the M. C. B. testing machine has forcibly impressed on the committee the advantages of good, well-annealed cast steel as a material from which to make the body of the coupler; so much so that in its judgment it is inadvisable to longer retain in the specifications any preferential test for any other material.

The separate knuckle test, in connection with the test of couplers is an unnecessary expense, as the knuckles are already thoroughly tested in tests 1, 3 and 4.

The specifications summarized are as follows:

After January 1, 1902, all M. C. B. automatic car couplers purchased by or used in the construction of cars for the above named company must meet the requirements of the following specifications:

Couplers will be subject to the inspection and tests of the representative of the above named company. The inspection and tests to be made with the aid of gauges and apparatus approved by the Association. Test couplers to be furnished free by manufacturers.

The bars, knuckles and locking pins, or blocks, must be accurately made to fitting gauges prepared by the manufacturers. When assembled, knuckles and locking pins, or blocks, must work freely, but without so much lost motion between knuckle and bar as will permit more than 1-16 inch vertical play in the former, or between knuckle and lock as will permit knuckle to drop forward beyond the proper contour line; but ¼ inch to ⅜ inch lost motion in the opposite direction is not undesirable.

Couplers must conform to M. C. B. contour lines. They must couple and uncouple with each other and with sample coupler. They should unlock easily and lock with freedom when knuckle is pushed in by hand. They must have complete locking fixtures. They must have steel pivot pins 1⅝ inches in diameter, and of a uniform length of 13¾ inches from under side of head to center pin hole for ⅜ inch cotter. Pivot pins, after being heated and having ends struck up, must be carefully and properly annealed.

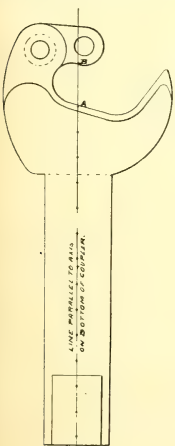


FIG. 1
BEFORE TEST

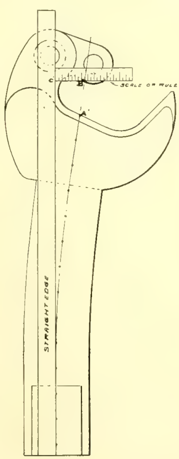


FIG. 2
AFTER TEST

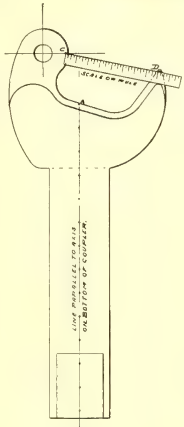


FIG. 3
BEFORE TEST

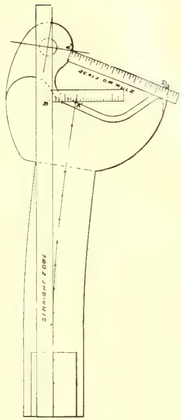


FIG. 4.
AFTER TEST.

Bars will not be accepted if distorted by improperly matched flasks, or other defects due to molding or casting, and must be free from shrinkage cracks, cold sheets and blow holes. The coupling face must be square with axis of bar. The dimensions shown on standard drawing of that part of shank lying between butt and head of coupler are maximum and must not be exceeded. The holes for pivot pin in lugs of bar must be drilled, or if cored must be broached out so as to be not more than 1 21-32 inches diameter. They must not only be in line with each other, but their common center line must be parallel to face of bar and at right angles to its axis.

Knuckles must conform to manufacturers' fitting gauges and to M. C. B. knuckle gauge, so as to fit properly in coupler head, and insure strict adherence to the M. C. B. contour.

As many couplers and knuckles as possible must be cast from each heat of steel or melt of iron used. All parts to be well annealed throughout.

The representative of the railroad company having inspected the couplers offered shall proceed to test from such as he accepts, selecting for test as follows: One complete coupler shall be taken at random by him from each lot of one hundred couplers accepted, or from each accepted heat of steel cast (for malleable iron, from each annealing heat), it being optional with the manufacturer which method is pursued.

The coupler shall be subjected to test No. 1, hereafter specified. If the coupler fails to stand the prescribed test, but before failing stands a sufficient number of blows to make a retest admissible, a second coupler shall be taken from the same lot from which the first coupler was taken. If it stands the test, that lot of couplers will be accepted as far as test No. 1 is concerned. Otherwise, that lot will be rejected and another lot substituted and tested in the same way.

List of tests to which couplers shall be subjected:

1. Striking test on closed knuckle of complete coupler, covering lots of 100 each.
2. Guard arm test, covering lots of 1,000 each.
3. Jerk test, covering lots of 1,000 each.
4. Pulling test, covering lots of 1,000 each.

TEST 1.—STRIKING TEST ON CLOSED KNUCKLE OF COMPLETE COUPLER.—As a preliminary, coupler is to be marked on bottom with a center-punched line parallel to axis of shank, the line being extended to inner face of knuckle; coupler is then rigidly held in a vertical position in machine with steel fillers and wedges, the latter sledged down tight, and this sledging

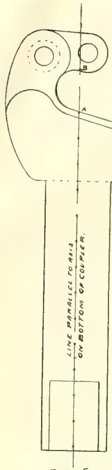


FIG 5
BEFORE TEST

FIG 6
AFTER TEST

operation repeated after each blow, with its axis in center line of drop, pivot-pin hole parallel to line through centers of legs of machine and butt resting solidly on anvil. Blows to strike directly on knuckle.

Three blows of 1,640 pounds, falling 5 feet.
Three blows of 1,640 pounds, falling 10 feet.

The coupler will be considered as having failed to stand this test if it is broken before it has received all the blows above specified, or if any cracks appear more than 1 inch long, or open more than 1-16 inch, or when center-punched line is distorted more than 1 inch, or when knuckle is found to have closed more than ¾ inch from its original position when pulled out against lock by hand, after receiving three blows at 5 feet.

TEST 2.—GUARD ARM TEST OF COUPLER.—As a preliminary, pivot pin, knuckle and locking device having been removed, coupler is to be marked on bottom with a center-punched line, parallel to axis of shank, and extending from coupling face or contour to back end of shank; a center-punch mark must also be placed at tip of guard arm and on lug.

Coupler is then held rigidly in a vertical position in machine, with steel fillers and wedges (the latter sledged down tight and this sledging repeated after each blow), butt resting solidly on anvil and blocked to prevent lateral motion, edge of guard arm in line connecting centers of legs of machine. Blows to strike directly on guard arm.

Three blows of 1,640 pounds, falling 3 feet.
Four blows of 1,640 pounds, falling 5 feet.

TEST 3.—JERK TEST OF COMPLETE COUPLER.—The couplers will be placed in yoke forgings of machine, and equalizer placed in position in closed knuckles. Blows to strike directly on equalizer, midway between the two couplers.

Three blows of 1,640 pounds falling 5 feet.
Three blows of 1,640 pounds, falling 10 feet.

TEST 4.—PULLING TEST OF COMPLETE COUPLERS.—Couplers to stand a steady pull of 120,000 pounds.

COUPLER CONTOUR GAUGE.

With the new design coupler contour gauge it was found that through the carelessness or captiousness of an inspector, a coupler could be condemned which was really within the prescribed limits. To prevent this, and to secure approximate coincidence of center lines of coupler head and gauge, a spring socket and contact has been added.

WORN COUPLER GAUGE.

The committee strongly recommended that the worn coupler gauge be put in general use at repair shops and repair tracks. While this will result in the condemnation of a great many knuckle pins, locks and knuckles, it will not affect a very large number of couplers.

TWIST GAUGE.

On account of the proposed changes in the shank of coupler, it has been necessary to alter the design of the twist gauge so as to be applicable to 5 by 5 inch or 5 by 7 inch shanks. Also so that it can be used with butts of even larger dimensions than those of the Association.

INCREASED DIMENSIONS OF COUPLER BODY.

Since the last meeting of the Asssociation the committee has experimented very largely with couplers with increased shank, and now presents a design of shank 5 by 7 inches back of the head, with the larger dimension in horizontal plane, as its recommendation as standard of the Association. This recommendation is made after serious consideration of the changes that will be necessitated in the various parts affected, but a change must be made to get increased strength, and the proposed change gives us this increased strength with the least additional material, and less seriously affects the related parts than would the change to a 6 by 6 inches.

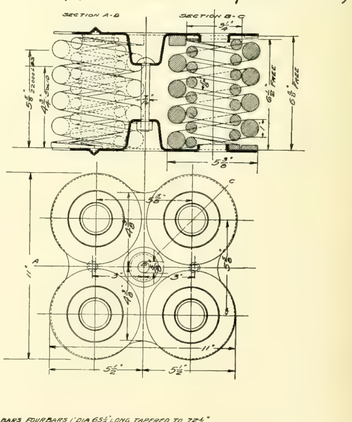
DISCUSSION.

Mr. Sanderson opened the discussion. He said some couplers were made where by carelessness of makers the dimensions departed from the contour lines; others deviated from the lines for the purpose of securing greater strength. He pointed out that the inability of the coupler to swing or move sideways sufficiently when passing round a curve was a serious drawback; it put an undue strain upon the coupler, greatly increased flange resistance, and so greatly increased the cost of haulage. He advocated a pivoted head as in part a remedy.

Mr. Schroyer said that on his road experiments made had shown a stress as great as 5,700 lbs. had been thus developed in passing round a 12-degree curve. The great importance of properly providing for lateral motion was therefore at once apparent. Flange friction on curves was greatly increased by want of adequate side play of couplers.

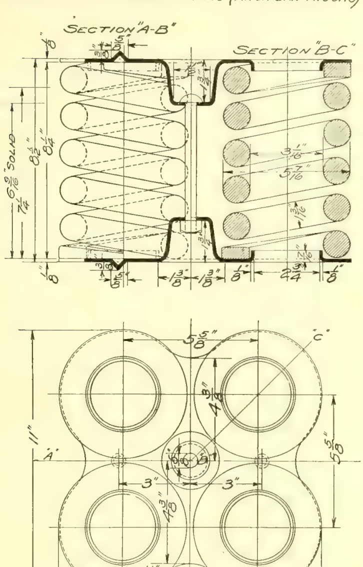
On motion, the revised specification was ordered to be submitted to letter ballot.

SPRING "A" 60000 LBS CARS (ARCH BAR TRUCKS)



EIGHT BARS. FOUR BARS 1" DIA 65¼" LONG TAPERED TO 72¼"
" " ⅝ " 62½ " " " " 66¼"
NORMAL WT OF EACH 1ST FOUR BARS 14 LBS 12 OZ. MINIMUM WT 14 LBS, 5 OZ.
" " " " 2ND " " 5 " 6 " " " 5 " 3 "
OUTSIDE DIAM 1ST FOUR COILS 5⅜" 2ND FOUR COILS 3¼"
HEIGHTS 1ST FOUR COILS 6⅝" FREE, 4¾" SOLID; 5⅝" 3970 LBS; CAP'Y 7440 LBS.
" 2ND " 6½" " 4¾" " ; 5⅝" 1530 " " 3060 "
CLUSTER OF SPRINGS
HEIGHTS EXCLUSIVE OF CAPS 6⅝" FREE; 4¾" SOLID; 5⅝" 22000 LBS; CAP'Y 42000 LBS.

SPRING "B" 70000 LBS CARS (ARCH BAR TRUCKS)



4 BARS $1\frac{3}{16}$" DIA, $73\frac{3}{4}$" LONG TAPERED TO $80\frac{3}{8}$".
NORMAL WT OF EACH BAR 23 LBS, MINIMUM WT 22 LBS 5 OZ
OUT-SIDE DIAM $5\frac{7}{16}$"
HEIGHTS $8\frac{1}{4}$" FREE, $6\frac{9}{16}$" SOLID; $7\frac{1}{4}$" 7400 LBS; CAP'Y 12500 LBS.

CLUSTER OF SPRINGS
HEIGHTS $8\frac{1}{4}$" FREE; $6\frac{9}{16}$" SOLID; $7\frac{1}{4}$" 29000 LBS; CAP'Y 50000 LBS.

Revision of Recommended Practice for Springs Including Design for Springs for 100,000 Pound Cars

REPORT OF COMMITTEE.

The question of properly designing helical springs is not a difficult matter, though somewhat tedious, and requires carefulness. The most important thing when designing, and also when buying springs, is to remember that good results cannot be obtained with a scarcity in material, and that therefore the amount of material that is placed in the spring governs the life of the spring to a large extent regardless of the quality of the material.

There are three conditions which govern the amount of material that should be used. First. Maximum allowable stress in the material. Second., Total capacity when solid. Third. Deflection from free to solid height.

Experience has demonstrated that with the usual quality of spring steel the best results are obtained when the maximum stress does not greatly exceed 80,000 lbs. per square inch in the outside fibers of the material, as under these conditions the material will not become fatigued, lose its elasticity and take permanent sets or break from repeated applications of the maximum load.

Good results are, however, obtained with a maximum stress of 85,000 lbs., but when the stress exceeds this figure the endurance of the spring is greatly endangered, unless the steel is of a very superior quality.

With the stress in the material established, the weight of the springs depends entirely upon the requirements as to total capacity, and total deflection, regardless as to the details of construction as far as relates to ordinary car springs. It is therefore quite immaterial if the requirements demand a spring composed of a single coil or of a number of coils; the weight of the steel in either case will be the same.

If this principle is thoroughly understood, one of the points which has perhaps caused a greater amount of contention between parties favoring particular construction of springs as against others, on account of supposed saving in material, will have been removed.

The prevailing practice in regard to the total capacity when solid and the total deflection, that is, the difference between free and solid heights, has generally been that the total capacity should be about twice the capacity required under the loaded car, and that the deflection should be between 1¾ and 2 inches, and these conditions have been allowed to govern in the design of the revised springs.

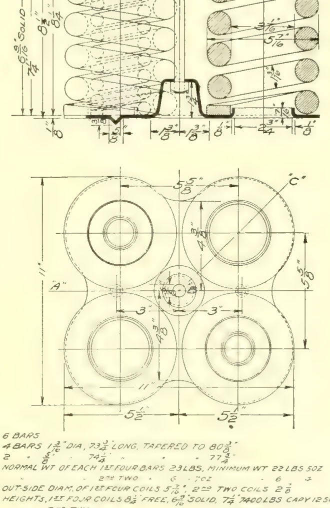
RECOMMENDATIONS FOR NEW SPRINGS.

In the preparaton of the new springs the following conditions may be noted:

First. Each complete cluster of springs has been considered as a unit, regardless of the number of individual coils contained in each cluster.

Second. Wherever possible the springs for the lighter cars are constructed of bars similar to those used for the heaviest cars by removing some or all of the interior coils; thus, for in-

SPRING "C" 80000 LBS CARS (ARCH BAR TRUCKS)



6 BARS
4 BARS $1\frac{3}{16}$" DIA, $73\frac{3}{4}$" LONG, TAPERED TO $80\frac{3}{8}$"
2 " $\frac{5}{8}$" " $74\frac{1}{4}$" " " " $77\frac{3}{4}$"
NORMAL WT OF EACH 1ST FOUR BARS 23 LBS, MINIMUM WT 22 LBS 5 OZ
" " " 2ND TWO " 6 " 7 OZ " " 6 "
OUT-SIDE DIAM. OF 1ST FOUR COILS $5\frac{7}{16}$", 2ND TWO COILS $2\frac{7}{8}$
HEIGHTS, 1ST FOUR COILS $8\frac{1}{4}$" FREE, $6\frac{9}{16}$" SOLID, $7\frac{1}{4}$" 7400 LBS CAP'Y 12500 LBS
" 2ND TWO " " " " " 2100 " " 3500 "

CLUSTER OF 6 SPRINGS
HEIGHTS WITHOUT CAPS, $8\frac{1}{4}$" FREE, $6\frac{9}{16}$" SOLID; $7\frac{1}{4}$" 33800 LBS; CAP'Y 57000 LBS

stance, spring "B" for 70,000-lb. cars with arch bar trucks consists of four coils similar to the outside coils of spring "D," and spring "C" consists of four outside coils and of two inner coils of same dimensions as for class "D."

Third. The stress in the steel has been calculated to be as nearly uniform in all the bars when solid as practical dimensions will permit, and has been confined within the limits of 80,000 and 85,000 lbs. per square inch, except in the springs for 100,000-lb. pedestal trucks, in which the limit has been exceeded on account of the impossibility of designing a satisfactory spring with a lower stress in the available space.

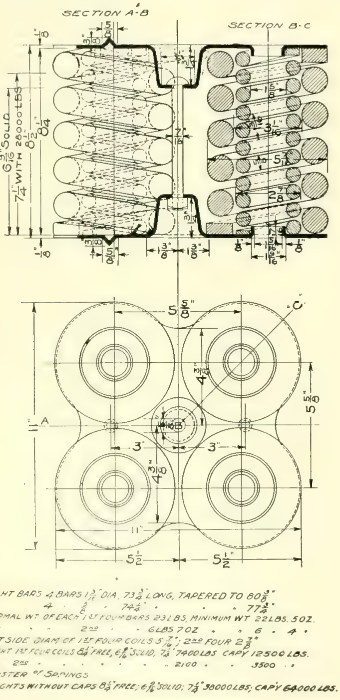
Fourth. In order to obtain the required capacities in double coil springs, it has been necessary to make the inner coils in some of the springs of heavier steel than would be consistent with the diameter of these coils when compared with the outer coils.

The increase in stress in material which would naturally result from such construction has been overcome by reducing the free height of the inner coils to dimensions corrresponding to the large bars used, so that the stress in both coils, when solid at the same height, will be practically the same.

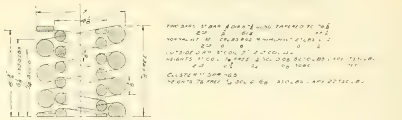
Fifth. No particular specifications have been prepared for springs for cars of 40,000 and 50,000 lbs. capacity using arch bar trucks, but springs for these cars may be made up from bars used in the construction of spring "A" for 60,000-lb. cars by removing two or all of the inner coils.

Springs A, E, F and G, as recommended, do not conform exactly to any springs now in service as far as known, but they are of such dimensions that they can be used in place of similar springs now in service. Of springs B, C and D there are about 200,000 in service, and from reports received they have met all requirements, and as they are correctly designed, there is no reason why failures should be anticipated.

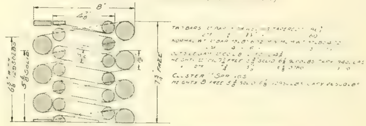
SPRING "D" 100000 LBS CARS (ARCH BAR TRUCKS)



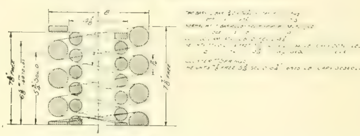
SPRING "E" 60000 LBS CARS (PEDESTAL TRUCKS)



SPRING "F" 80000 LBS CARS (PEDESTAL TRUCKS)



SPRING "G" 100000 LBS CARS (PEDESTAL TRUCKS)



It is believed that all of these springs will fully meet the requirements of a majority of the railroads, as well as of the manufacturers of springs, and while there may be certain constructions of trucks for which they will not be suitable, the number of such trucks is not large, and they will gradually disappear.

The report on recommended practice for springs, including design for 100,000 lbs. car was on motion referred to letter ballot.

Cast Iron Wheels

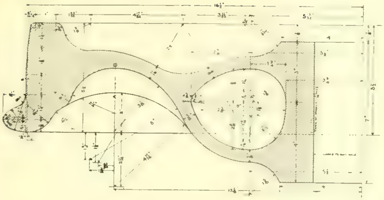
REPORT OF COMMITTEE.

The committee appointed to investigate and report on the question of locating the inner face of cast iron wheels to the gauge point, and the thickness of metal between bore and ring core, and to recommend minimum weights for wheels for use under 60,000, 80,000 and 100,000 lbs. capacity cars, reports as follows:

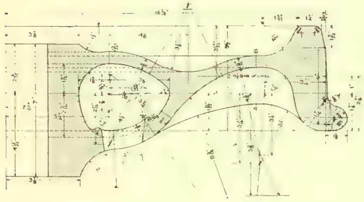
As to locating inner face of hub to gauge point. If outside face of hub next to box projects 3 3-16 inches beyond gauge point, it will allow a clearance between the face of the hub and box of one inch in the normal position. The lost motion between the journal, the brass, the wedge and the box is about ¾ inch. The dimensions given above will afford a clearance of at least ¼ inch between the hub and the box when all lost motion between the journal, the wedge, the brass and the box is fully taken up.

The committee believes that this amount of clearance is sufficient. It does not believe that it is practical to make a turnplate to locate the hub with reference to the gauge point, but that the practical method will be to lay a straightedge across the outside of the rim, measuring in 15-16 inches, which will give the proper location of the face of the hub. It should be determined that the pattern is so made that the wheel is 5½ inches over all between the inside of flange and outside of rim before the measurements referred to are taken. This applies to 60, 80 and 100-thousand lbs. capacity cars.

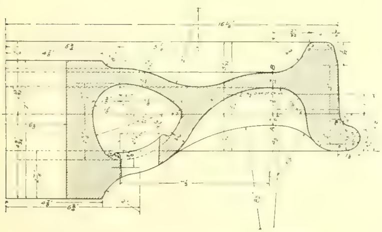
As to thickness of metal between bore and ring core, any thickness greater than one inch is sufficient. The committee recommends that a thickness of 1⅛ inches between bore and ring core after the wheel is bored should be made standard for all sizes of wheels.



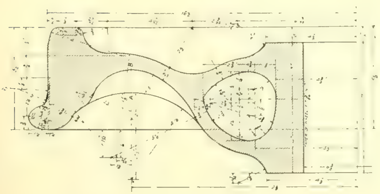
PATTERN No. 1 for 60,000 LBS. CAPACITY.



PATTERN No. 2 for 60,000 LBS. CAPACITY.



PATTERN No. 3 for 100,000 LBS. CAPACITY.



PATTERN No. 4 for 100,000 LBS. CAPACITY.

Minimum weights of wheels recommended for repairs to foreign cars:

For 60,000 lbs. capacity, 550 lbs.
For 80,000 lbs. capacity, 590 lbs.
For 100,000 lbs. capacity, 620 lbs.

On and after Sept. 1, 1901, it was recommended that wheelmakers should be required to have the nominal weight cast on them, and the following weights were suggested:

For 60,000 lbs. capacity cars, 575 lbs.
For 80,000 lbs. capacity cars, 600 lbs.
For 100,000 lbs. capacity cars, 625 lbs.

The report called attention to the fact that required weight was often gained by the simple addition of metal, which did not add to the strength of the wheel.

The committee attached four drawings of wheels which have been in extensive use and which have given satisfactory results. Patterns Nos. 1 and 2 are designs for wheels for 60,000 lbs. capacity cars, weighing about 585 lbs. Nos. 3 and 4 are for wheels of about 600 lbs. weight, and are for use under 100,000 lbs. capacity cars.

DISCUSSION.

In the discussion on cast iron wheels Mr. Garstang said he was opposed to the alteration of standards unless great benefit was to be the result. Wheel design for heavy freight cars he considered to be quite as important as design of standard axles. He did not think a change in the thickness of the wheel flange advisable at the present. He strongly advocated as the maximum weight for 60,000 lbs. capacity cars, 590 lbs.; for 80,000 lbs. cars, 640 lbs., and for 100,000 lbs. cars, 680 lbs. He contended that if the committee had not recommended change of flanges the cuts appended to the report showed changes. He further said that the thickness of the plates, as shown in the cuts, was ¾ inches, he thought ⅞ inches for 80,000 and 100,000 lbs. cars was advisable; also, that the brackets should be ⅞ inches wide on edge and taper back to wheel, with a good ¾ fillet, and should extend well onto the rim and beyond the intersection of the plates of the wheels. That point where the plates met was often the area where dirt lodged in the process of casting, and blow holes were likely to form there.

Mr. Tonge pointed out that 60,000 lbs. cars were often loaded so as to be 75,000 lbs., and that full maximum weight was advisable.

Mr. Barr thought that the iron in very many wheels now in use had been melted over and over again, until the metal was unfit for service, and that this fact would help to account for some of the failures of wheels which had taken place in recent years.

Mr. Hennessey said he thought Mr. Barr had understated the case. He believed iron had been melted over, instead of a dozen times, perhaps twenty-four times, in making wheel after wheel, and that it had so deteriorated that it would make a poor wheel, even if the wheel weighed 800 lbs. He proposed that members should insist on good material, and not let the manufacturers build up the wheel with mere weight and any kind of material they saw fit to use.

Mr. Stark thought there were fewer wheel failures now than there were some years ago. With heavy wheels, the hubs had to be made hard in order to stand being pressed on; when the axle got hot it burst the wheel in the wheel fit. The flanges, he said, were the principal trouble now, and if increased in thickness 1-16 of an inch, and the same amount a year or so hence, it would give the engineering department a chance to alter their frogs, switches and guard rails gradually.

Mr. Symington thought the alteration of the wheel flange should not be held back on account of the track. He cited a case which came under his own observation, where a car which was an inch out of gauge had come from California to the Atlantic coast without mishap. He hoped the committee would look into the alleged repeated remelting of old wheels and get at the facts in the case.

The committee was continued, and was instructed to make a very wide inquiry into the whole subject.

Uniform Section of Siding and Flooring

REPORT OF COMMITTEE.

This subject has an important commercial as well as a mechanical side. If the M. C. B. Asssociation and car builders generally would adopt and use sections for flooring and siding,

roofing and lining. which approximated closely, as far as rough sizes go, to the commercal sizes put in buildings, a reduction in price per thousand feet could reasonably be expected, and orders could be filled more promptly.

Flooring to be of two kinds—square edged, or ship-lapped, both kinds dressed all over. The lumber from which this flooring is to be made is commercial size, 2-inch sawed in thickness, and ranging from 5 inches to 10 inches in width. Mill men can furnish flooring of random widths in the rough cheaper than they can flooring of one uniform width. It being cut to commercial lengths, if it does not come up to specification for car building, can be cut and used for other building purposes. The committee recommends the making of the ship-lap central, so that the best side can always be turned up.

It is recommended that the same section of material be used for siding, roofing and lining, and that the tongue and groove be placed centrally, so that either side can be used as a face. All material of this character can be run through planers and matchers without changing knives. This material is intended to be made from regular commercial 1-inch sawed stuff, and to be dressed from 6-inch and 4-inch widths to match up 5¼ inches and 3¼ inches. By accepting material of the two widths and stacking them separately this lumber can be obtained cheaper and more quickly. Mill men claim that it is becoming very difficult to get large quantities of lumber of right specifications in the greater widths, and it is believed to be wise at the present time to concede this point and agree to accept lumber for siding, roofing and lining made from the rough of two widths, namely, 4-inch and 6-inch.

DISCUSSION.

Mr. Leeds wished the question of ship lap or tongue-and-groove submitted to the Association by letter ballot. He said if this was done, he had very little doubt as to how it would be answered, the ship lap being the better form.

Mr. Appleyard said that the question of commercial sizes of lumber was what the committee had been concerned with, and he thought it better not to bother about the kind of lap used.

Air Brake Hose Specifications

REPORT OF COMMITTEE.

A circular of inquiry was sent out asking ten questions, and the replies are commented upon somewhat as follows:

In comparing the specifications received from members representing 253,381 cars, the committee finds that the character of the rubber and cotton fabric specified is practically alike and the quality of the gum in the inner tube is uniformly the same.

The limiting dimensions of length and diameters are alike in all cases, with the exception that two roads specify that the ends of the hose shall be enlarged to receive the fittings, while all of the other roads specify that the inside diameter shall be uniform from end to end.

The requirements in regard to markings for the hose are similar in all specifications, with the exception that two of them show the size of hose and one a serial lot number in addition to the regular marking. Your committee believes that the use of a serial lot number is desirable for the reason that it facilitates the identification of accepted or rejected lots of hose by the testing department and others who have to do with the handling of hose prior to its being put into service. It also affords a ready means of referring to records of tests when hose are finally removed from service.

It will be noted that the specification in regard to friction and stretching tests of one of the roads referred to is what might be called a medium grade specification, while the other seven specifications are what might be termed high-grade specifications, as understood by the rubber manufacturers.

The committee had not sufficient data at hand to enable it to determine whether the medium grade specification is of a sufficiently high grade character to recommend its adoption. It is understood that specifications of this character are used by several roads, but as they have not been in use a sufficient length of time, your committee is unable to make any recommendation in that respect.

The comments contain notice of the individual action of certain roads on particular points. For example:

One road specifies that the hose shall be subjected to a flexibility test, which consists of mounting a test hose on standard fittings, ends rounded to prevent undue cutting of the tube, and placing on a vibrating machine; hose is subjected to air pressure of 60 pounds to the square inch and must not fail in less than 75 hours.

A form of specification was submitted by the committee.

DISCUSSION.

Mr. Canfield asked why the serial number was required on the hose. He was informed that the serial number was for the purpose of identification after a test had been made.

Mr. Sanderson said that more than 80 per cent. of loss was due to air hose chafing. He also said a great deal of trouble arose from poor work in putting couplings into the hose by air and other machinery. Something should be done to strengthen the hose near the nipple.

Mr. Canfield said that the use of proper hose caps which held the hose up out of the way and prevented kinking would be of great value.

Chemical Composition of All Steel Car Axles

REPORT OF COMMITTEE.

At the convention of 1900 informal discussion of this question disclosed the fact that several members held at that time that the present specifications provided too high a proportion of carbon. The committee investigated the subject by corresponding with these members, and otherwise, and does not find any evidence that the percentage of carbon allowed in the present specification is too high.

In addition to the above investigation, the committee had been in correspondence with railroad companies who have specifications for steel axles, or who have used the present M. C. B. specifications, so far as the opinion of those in charge of the car departments on these railroads is concerned, that the percentage of carbon now allowed is not too high, and it is even intimated in some instances that if any change is made it should be in the direction of higher carbon.

There are some railroads that have used axles of steel having a less percentage of carbon than provided in the M. C. B. specifications, and the opinion on these roads is that they have been getting good axles with somewhat less carbon than in the present specifications. However, this is not positive proof that the amount of carbon as now allowed in the specifications is too high. On the other hand, several railroad companies which have gone into this matter quite thoroughly, not only in connection with car axles, but with steel used for other purposes where alternate stresses tend to break the piece, are quite positive that, if anything, the percentage of carbon should be made higher rather than lower.

The committee did not feel justified in recommending any increase in the percentage of carbon above that allowed at the present time, but is strongly of the opinion that no decrease should be made, and urged that the specifications in regard to chemical composition shall remain as at present.

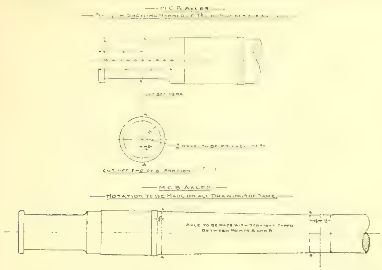
SUGGESTIONS CONCERNING SPECIFICATIONS.

In connection with this subject, the committee desired to offer some suggestions having a bearing on the subject of the specifications.

"First. As to the location of the borings to be taken from steel axles for chemical analysis. This should be distinctly defined by a diagram as shown in Fig. 1.

Second. The present M. C. B. axles, except of the later designs, have not had their dimensions determined upon the basis of uniform fiber stress between the center and the hub portion of the axle. In order to have uniform fiber stress throughout the body of the axle, it is absolutely necessary that the taper between the wheels should be straight and uniform. Your committee would recommend that a notation to this effect be placed on the standard drawing of M. C. B. axles as shown in Fig. 2.

Third. It is further thought by your committee that the question of having all steel axles rough turned should be seriously considered. There is a decided advantage to the railroad companies in getting steel axles turned throughout their length, because it enables the inspector to determine readily whether the dimensions and contour required are strictly followed.



Fourth. M. C. B. axle "A," having journals 3¾ by 7 inches, is somewhat small at the wheel seat according to the method followed for the design of axles "C" and "D." The wheel seat of axle "A" should have a limiting diameter of 4⅞ inches, and allowing ¼ inch to be turned off, the original size should be 5⅛ inches.

Fifth. Axle "B," having journals 4¼ by 8 inches, now has a wheel seat 5⅜ inches in diameter. The limiting size of wheel seat for this axle should be 5½ inches, and allowing ¼ inch to be turned off, the original size should be 5¾ inches. The center of this axle is now 4⅝ inches, and your committee would recommend that it be made 4¾ inches, in order that it shall have the same fiber stress as used in axles "C" and "D."

Sixth. Axle "C," having journals 5 by 9 inches, now has a wheel seat 6⅜ inches. As the limiting size is 6¼ inches, it is thought that the new size should be 6½ inches, leaving the axle otherwise unchanged.

Seventh. Axle "D," having had journals 5½ by 10 inches, now has a wheel seat 6⅞ inches. As the limiting size is 6¾ inches, it is thought that the new size should be 7 inches.

Eighth. In accordance with the designated standards of the Association, axles "A" and "B" are specified for use under cars of 40,000 and 60,000 pounds capacity. It is only necessary to remind you of the fact that an axle is designated for carrying a definite weight to make it plain that the axles of the Association should not be designated for cars of particular capacity. This is at once apparent when it is considered that under this assumption no consideration is given to the weight of the body of the car, which varies through wide limits. This is, of course, a portion of the weight carried, and together with the lading makes up the total weight carried on the car axles. Therefore, your committee would ask your consideration for a better designation of these axles, which would be as follows:

Axle "A," designed to carry 15,000 pounds.
Axle "B," designed to carry 22,000 pounds.
Axle "C," designed to carry 31,000 pounds.
Axle "D," designed to carry 38,000 pounds.

Ninth. In conclusion, your committee feel that they should call the attention of members of the Asssociation to the desirability of ordering their axles according to the M. C. B. specifications. There are a number of railroad companies ordering steel axles and having specifications varying slightly from those of the Association. It would appear to be to the advantage both of the manufacturers and of the railroad companies to have these specifications uniform, and your committee would urge serious consideration of this question."

DISCUSSION.

Mr. Gibbs said that the usual failure of steel axles was by what he called fracture in detail. The axle did not snap in two all at once, but broke a little at a time, until it got below the limit. He said that since 1896 he had used 307,000 hard steel axles, and that at the time he proposed his specification some makers had objected, and said they would not be responsible for the performance of such axles. He had had during that time but three failures, two of which were out of the same heat, and were due to internal flaws; all three broke early in their lives. This, he thought, proved that the chemistry of the steel was all right. It was quite possible to make bad axles out of good steel. With car axles designed so as not to be subjected to more than 21,000 lbs. fibre stress, he thought that their "finish" would be caused by wear and not by breakage.

Prof. A. L. Colby was glad that the committee was not decreasing the carbon below 40 per cent. He said, referring to the failures spoken of by Mr. Gibbs, that in all probability there had not been enough discard of the ingot in these cases. He saw no reason for specifying silicon, as was done. Home companies' specifications called for .05 of silicon for car axles and .20 for engine axles. There was no good reason for this, and nothing gained by insisting on it. He advised limiting, by specification, the phosphorus and sulphur in the steel, but leaving the manganese and silicon free. He advocated the specification of open hearth steel. Copper, he also thought, need not be specified, as some did, at .03. He thought it would be wise for the Association to drop all the deadwood out of the specifications and compel manufacturers to live up to the important parts of it.

This question was referred to letter ballot.

Draft Gear

REPORT OF COMMITTEE.

Draft gear failures, which have been referred to in discussions during the past year, seem to be chiefly breakages of the old riggings which were not designed for the work they are now called upon to do. So far as the committee had observed, several draft gears of recent design are showing good results in service.

The use of metal underframing, allowing the draft attachments to be placed between and fastened direct to the sills, is looked on as one of the most important steps which can be taken in car design favorable to the draft gear. Experience so far has shown that with metal underframes the front and back follower-stops can best be lugs united in one casting with heavy connecting ribs. This gives a large area in contact with the sills and permits of the use of an ample number of rivets.

The committee is of the opinion that the introduction of steel underframes will favor the draft rigging, eliminating the troubles from loose attachments due to the shrinkage of wood and the backing off of nuts.

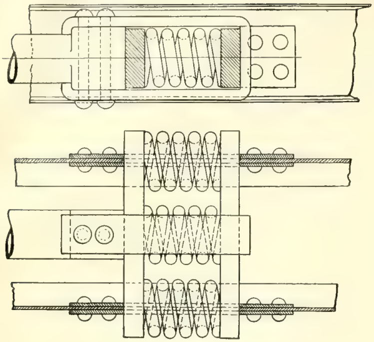
What the committee considered an important principle is that with metal underframes, and wooden cars with low floors, the line of draft should be on the neutral axle of the centre sills. It was realized that it is not always possible to place the draft rigging on the neutral axis of the centre sills with this construction, but this does not affect the correctness of the principle.

Where the lowering of the car floor is objectionable, the committee recommends that the draft timbers extend at least to the body bolster. There are, however, preferences for continuous draft timbers.

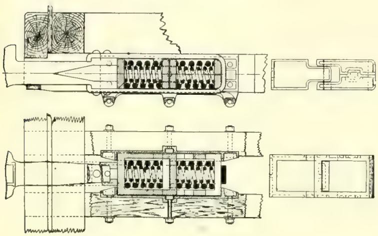
There is no reason why there should not be uniformity in new car construction regarding the spacing of centre sills. Present recommended practice is 8-inch sill spacing. This now seems inadequate, on account of the general use of both twin and tandem spring arrangements. The committee suggested 10 inches and 14 inches.

The committee has considered the advisability of recommending a standard spacing of bolts and lugs, with a view to having different draft riggings as a whole, interchangeable one with another. It is free to say that the adoption of such a standard has met with little favor and is considered rather impractical even by members of the committee.

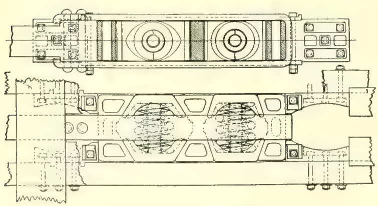
While there are two ways of receiving the pulling forces on the car, through attachments at the front end or at the rear, the principle of all draft gear as regards buffing forces is alike, i. e., the buffing strains are taken by the draft gear proper until the spring or other resistance is exhausted, when the remainder of the shock is transmitted direct to the car framing through the coupler horn or buffer blocks, if present. In the latest form of draft rigging, the friction gears, the capacity of the gears to absorb shocks has been increased to between 100,000 and 160,000 pounds, leaving a smaller propotion of shock to be transmitted by the coupler horn, this increased capacity being obtained with practically no recoil. It is readily conceded that the theory of the friction draft gear is correct, but few have had



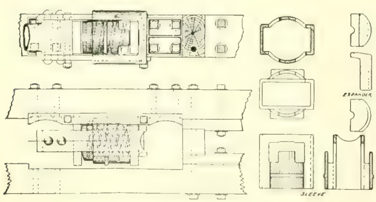
L. M. Slack Triple-Spring Draft Gear.



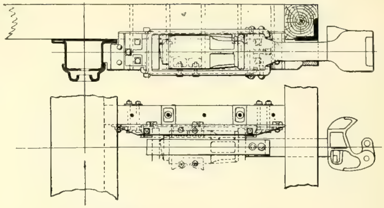
Thornburgh Draft Gear.
Tandem-spring box followers.



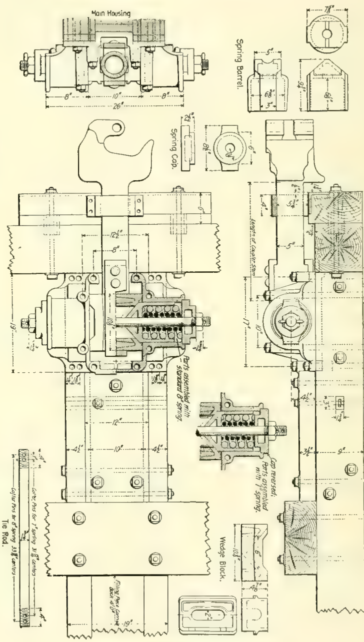
Piper Draft Gear and Buffer.



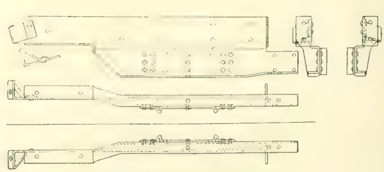
McCord & Co. Coupler Spring Dampener.



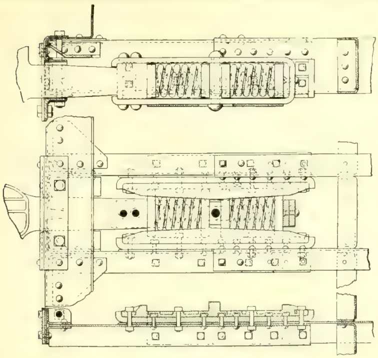
Westinghouse Friction Draft Gear.
Applied to cars with wooden sills and steel bolsters.



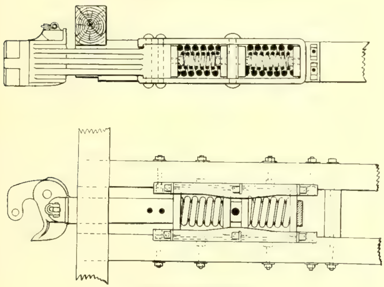
Sessions-Standard Draft Gear.



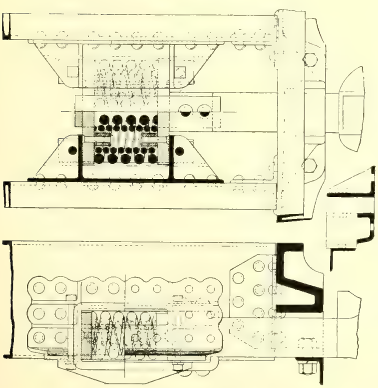
Heishley's Pressed-Steel Draft Gear.



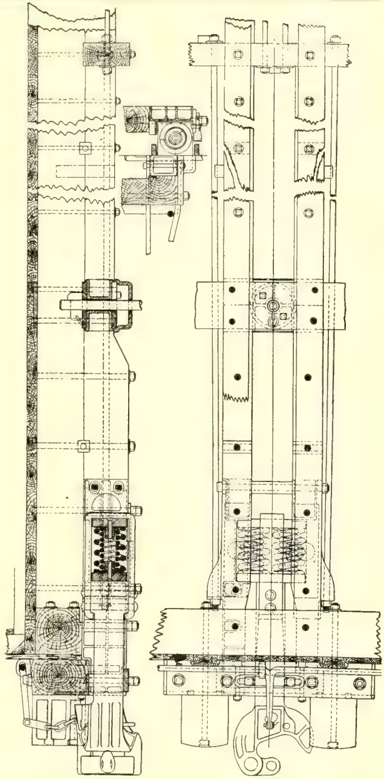
Miner Draft Gear.
Applied to 100,000-lb. capacity cars; B. & O. R. R.



Miner Draft Gear.
60,000 and 80,000 lb. cars, wooden sills.



American Car & Foundry Co. Draft Gear.
Steel cars, 60,000 to 100,000 lbs. capacity.

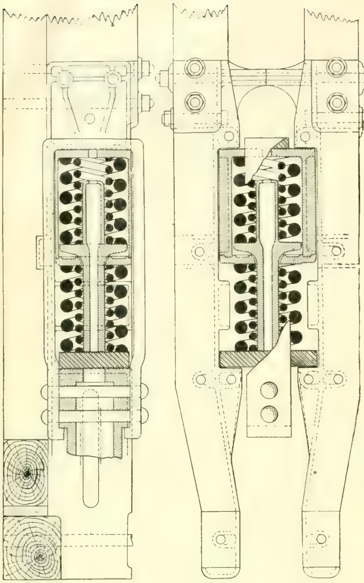


Gould Malleable Draft Beam No. 97.

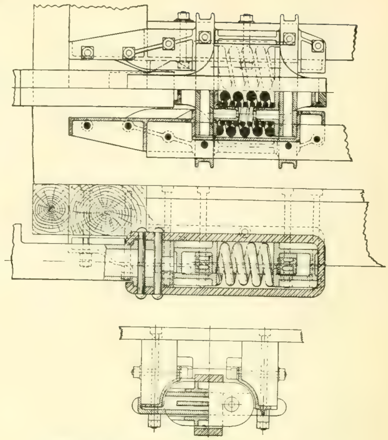
any experience with these gears; they have not been in service long enough to estimate their life or wearing qualities, or in any way determine whether the increased first cost and greater complication is warranted. No recommendation was made as between friction and spring gears.

Metal draft beams are being used extensively in place of wood where the rigging is placed below the sills. These are of a variety of designs; they are commonly made in each case to suit the car framing. The committee has considered the advisability of recommending a standard spacing of bolts and lugs, with a view to having different draft riggings as a whole interchangeable one with another. The adoption of such a standard has met with little favor. The point is made that these metal beams will probably last the life of the car and will require renewal only in case the cars are broken in wrecks. With this in view, it seems hardly worth while to attempt to standardize this detail, as a good deal must be sacrificed for the sake of uniformity.

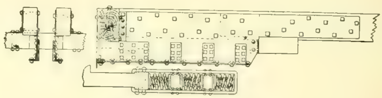
No better way is known of attaching wooden draft timbers or metal beams to the sills than by vertical bolts, which should be 7-8 inch or 1 inch in diameter. Wide keys or lugs are preferred to small keys, well removed from the body bolsters, where the sills should be maintained the full section.



Butler Draft Gear Attachment.



C. B. & Q. R. R.—Dayton Twin Springs and Sill Plates
Line of draft at bottom of sills.



Francis' Plate Metal Draft Gear.

It is found that the M. C. B. draft gear spring, 6 1-4 inches in diameter by 8 inches high is used generally in spring riggings; at least the dimensions are adhered to and should be retained.

The Cleveland, Cincinnati, Chicago & St. Louis R'y is using draft springs of larger capacity than the M. C. B. spring, but of the same outside dimensions. These springs have three coils which fit closely one coil within another. The outer coil tested alone to 6 inches, requires a pressure of 16,700 pounds; the second coil alone, 5,400 pounds, and the inner coil have in all 23,400 pounds capacity, but when assembled, a little over 28,000 pounds is required to compress the group to 6 inches. The difference is accounted for by the friction of one coil on another. This is mentioned here as showing how the capacity of a spring of the standard dimensions can be increased.

DISCUSSION.

Mr. Bronner asked to have two members added to the committee, to be appointed by the executive committee.

Mr. Sanderson said that the drop test ought to be applied entirely by a jack on two gears at once, the gears to be under strain at the time they received the shock. This state of affairs would simulate service conditions very closely. Service tests were appreciated by railway managers. The time was approaching when a "proving ground" for the trial of couplers would have to be established, like that used by the Ordnance Department of the government. He thought that it might require three years to come to something definite as, after a first trial, manufacturers would reconsider their designs, and provide for new conditions and strengthen weak parts and insist, as they had a right to do, upon further and further tests.

Mr. Hennessey wished that some action could be taken at once; the heavy engines, he said, are here, heavy trains are being drawn by these engines, and the draw gear we have now is not adequate. The future draw gear should never be placed below the centre line of the sills and should be continuous gear.

Mr. Sanderson thought the plan of using floor joists as draw sills was not the thing, some form of construction which used a heavy centre column between draw gears and substantial dead blocks were required. He said that the placing of draw gear below the centre line of the sills was unmechanical and the practice was productive of much damage and consequently heavy repair bills. No good form of draw gear could be satisfactorily used with that form of construction.

Mr. Rhodes said that with a view to "stirring up the animals" he would suggest that the committee publish in the various technical journals what they might have to propose in the way of draw gears, and invite draw gear men and others interested to come forward and state their views, and criticise the designs submitted.

Mr. Quereau said that continuous draw gear design was a subject well worth considering and discussing. It is a form of construction that is thoroughly and correctly mechanical; with it all the sills are included in the pull. He did not say that such a draw gear was now in existence, but he believed it was possible to evolve it in time. Buffing blocks certainly were required.

Mr. Clark said that for years he had been using draw gears, the centre line of which coincided with the under side of the draw sills.

Mr. Appleyard suggested deepening the centre sill so that the line of thrust could be more nearly in coincidence with the centre of the sills.

Mr. Roberts did not think the committee was actually called upon to design draw gears.

Mr. Canfield thought the draw timbers should go back, at least two feet beyond the body bolster, and so help to take the load.

Mr. Symington thought that the draw gear bolts broke often because the wood had shrunk away from the keys. The keys

were all right when new, but when the wood shrunk the keys were left loose. He advocated making draw bolt holes slightly oblong.

Mr. Stark did not agree with the idea that shrinkage was responsible for this; he said he believed that when the keys gave trouble they had not been put in properly at first.

Mr. P. Leeds spoke very emphatically in condemnation of the tail bolt. He said if used in bridge construction in a way similar to that in which it was used in cars, it would, in case of failure, be considered nothing short of criminal negligence. It had no place in draw gear and should not be used.

Revision of Rules for Loading Long Material

REPORT OF COMMITTEE.

In this report the existing general instructions are greatly condensed, and more are added. Thus, rules 1 to 31, inclusive, may be called general in character, after which follow detail instructions for loading lumber on open cars, rules 32 to 52, inclusive. Rule 53 governs the loading of dressed lumber. Rules 54 to 59, inclusive, regulate the loading of logs, telegraph poles, piling and props on open cars; 60 to 63 refer to the loading of the bark; 64 to 68 deal with the loading of ties and fence posts on open cars. Rules 69 to 79, illustrated by numerous cuts, govern the loading of long structural material on open cars; 80 to 82 are concerned with loads which overhang at both ends; 83 to 94 regulate the loading of flexible plates, and flexible materially generally; 95 to 101 govern the loading of turntables, and 102 to 106, that of rolled material of small sectional area. Rules 107 to 111 deal with cane pipe on open cars, and 112 to 114 take up the matter of loading stone on open cars.

DISCUSSION.

Mr. Smith spoke strongly in favor of having high stakes used for securing long material, wired together at the top and not fastened by pieces of board nailed on. The latter he considered a very insecure method of fastening. He had recently witnessed an accident where this flimsy method of holding the stakes together with boards and nails had failed, with the result that two men had been killed. He insisted that wire should be used in every such case.

Mr. Rhodes said a great deal of damage was done by the loading of railroad ties in box cars. The ends of the cars were frequently damaged by such loads.

Mr. Hennessey said that some roads loaded ties in box cars with a row of ties placed with one end on floor and one on end of car. This presented an angular surface to the load in case it showed any tendency to shift, and in case of shock there would be a tendency to lift the load up at the ends, and so reduce the danger of damage to the end of the car.

Mr. Symons spoke of the difficulty of getting the correct weight of car lumber shipments and proposed that a committee of the M. C. B. Association should confer with a committee of the M. M.'s Association on this matter, which suggestion was agreed to.

On motion it was decided to have the whole of the arbitration cases from the first up to date published in book form, with complete index, also a full index of the M. C. B. proceedings from its first year until now. The total cost for all this work was estimated at $1,600.

No report was presented by the committee on side bearings and centre plates. The subject was referred to the executive committee for report next year.

Election of Officers

The annual election of officers of the Master Car Builders' Association, which was held at the concluding session, resulted as follows: President, J. J. Hennessey, Chicago, Milwaukee & St. Paul R. R.; first vice-president, J. W. Marden, Boston & Maine R. R.; second vice-president, F. W. Brazier, New York Central & Hudson River R. R.; third vice-president, W. P. Appleyard, New York, New Haven & Hartford R. R. Executive Committee—George W. Demarest, Pennsylvania lines west of Pittsburg; William Renshaw, Illinois Central; J. T. Chamberlain, Boston & Maine. Treasurer, John Kirby, Lake Shore & Michigan Southern.

An Apology

The RAILROAD DIGEST this month offers to its readers a resume of the reports of committees of the Master Mechanics' and Master Car Builders' Associations, and also a condensed report of the discussions which followed the reading of each report. If the digest feature of our publication and the Record of Patents suffer somewhat in consequence, it is only due to the pressure on our columns for the month of July, in our endeavor to give our readers a digest of the work done at the conventions. A perusal of the able and suggestive reports, and the interesting discussions which took place this year will fully repay the readers.

A Sequel to Our Railroad Puzzle

The first paragraph under the head of Conducting Transportation, on page 233, of the June DIGEST, was called, "A Railroad Puzzle," and was an engrossing topic of conversation on the verandah of the Grand Union Hotel at the recent conventions of the Mechanics' and Car Builders' Associations at Saratoga. Many and eager were the discussions, and when it was whispered about that our chart of the wheel arrangement of engines, called "Locomotive Classification and Nomenclature," would be given away to all who successfully solved the problem, excitement rose to fever heat. Gentlemen with new ways of doing things, to exploit, forgot to urge their claims, in order to bet money on this or that clever solution of the vexed question. One gentleman, with notebook and pencil, proved conclusively, beyond the shadow of peradventure, that the meeting point must be just exactly 442.08936 miles from New York city, when the gentleman who had just invented the new-improved-extra-powerful-electric-search-light-ray which, when directed upon the top of the smokestack at night, will show at a glance if the fireman is a smokeless firer and whether he is saving 22.9 per cent. of coal, spoke up, something after this style: "I don't know much about mileage or things like that, but the question is, 'At the meeting point, which train will be farthest from New York?' and it seems to me that no matter whether one engine had leaky flues, a Vanderbilt boiler, high wheels, or heated the train with the air brake pump exhaust, and no matter whether the other had given a vaudeville performance all along the line, or had sold platform tickets from nickel-in-the-slot machines at every station, when they arrived at 'the meeting point,' wherever it happened to be, both trains would be at the same distance precisely from New York, and, for that matter, at the same distance from Chicago; so there you are."

Then silence fell, and the first speaker remarked solemnly, "What will you take?" and the inventor made use of some vague baseball expression, about liking to have the pitcher throw the ball very high, and, after the fizz of a carbonator had died away, somebody said, "Here's how," and this was followed by profound silence for several seconds.

[We will give two charts away free, postage prepaid, to know what the irrelevant reference to baseball had to do with our puzzle, and what on earth these two gentlemen were doing.—EDS. RAILROAD DIGEST.]

"Talking of that report on 'Up-to-date' roundhouses and lifting engines," said the visitor from Canada at the recent M. M. convention, "not long ago there was a case tried up our way in which a contractor was trying to recover against the owner for the work of moving a house from one part of the city to another. 'In order to put rollers under,' said the judge, 'how was the building lifted?' 'My client in this case,' replied the learned Q. C., 'did what is not always successfully accomplished.' 'Indeed,' said the judge, 'what did he do?' 'He raised the whole house on four jacks, my lord!' The gleam of appreciative intelligence which shot from the judge's eye to the blandly smiling counsel was all just then which court etiquette would permit."

The Monarch Brake Company, of Detroit, announces that the Waycott-Andrews Supply Company, of St. Louis, is no longer one of the selling agencies of the Monarch brake beam and is not connected in any way with the Monarch Brake Beam Company.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Locomotive Equipment, Appliances and Related Matters

Steam Jets to Stop Clinkering

American Engineer and Railroad Journal, May, 1901, p. 141.

Admission of steam in jets into fire-boxes for the improvement of combustion was practiced years ago for the purpose of mixing the gases in order to bring oxygen into intimate contact with the combustible gases. Jets of air were used for the same thing, but owing to the cooling of the furnace by the heat absorbed by the steam and that required to heat the air the resultant economy has not appeared to be great. A large excess of air may be in the fire-box, and yet a large amount of combustible gases may pass off unconsumed because of imperfect mixture if the air is admitted above the fire. The best place for supplying air is through the grates and the fire, and if there are no holes in the fire the mixture of gases is sure to be good. When admitted below the fire steam is not likely to deprive it of any of its heat. It seems to prevent clinkering, which is so detrimental to locomotives. The theory of the action of steam under the grates is that of dissociation in passing through the fire, and the hydrogen liberated from the oxygen combines with the sulphur to form hydrogen sulphide. The sulphur thus becomes a gas, instead of a solid.

Cast Steel Locomotive Frames

Railroad Gazette, June 14, 1901, p. 414.

Of late years there have been many cast-steel frames used on heavy locomotives. Inperfections in castings have been found, but still many steel frames now in use and their service record as a whole seems to favor their general adoption. Mr. R. M. Galbraith's article gives a complete design of his patenting, and also a record of wear of driving boxes in regular heavy service, with the mileage of the nine locomotives considered. The driving boxes of these locomotives are cast-steel, with all faces babbited. The article also contains records of defects found in cast-steel frames having rails of general rectangular cross section, similar to the old wrought iron frame sections. These defects serve to point Mr. Galbraith's argument for making a frame of I-beam section such as his own, or of other relatively light cross section, the advantage being not confined to lightness for a given strength, but being also in offering less chance for concealed blow holes or for imbedded dross. Against the criticism that destructive shrinkage strains might exist in a frame such as made from his design, Mr. Galbraith has the record of eleven engines for the term of years given, without a frame failure; while on ten locomotives having forged frames there were six broken frames due to imperfect welding during the same period. It is stated that a cast-steel frame costs less than a wrought iron one of the same capacity. Records from twelve important railroad companies and one steel works who have a large number of locomotives with cast-steel frames, testify in favor of them. Thus, the only fair conclusion seems to be that cast-steel for locomotive frames has made great strides toward permanent use.

Tank Well and Strainer

American Engineer and Railroad Journal, May, 1901, p. 157.

In looking over the tenders of the new passenger engines built by the Brooks Locomotive Works for the Lake Shore and Michigan Southern Railway, this tank valve and strainer was noticed, and while it is not new, its good features warrant its presentation here. This design was developed by Mr. John Player on the West Shore road a number of years ago. It combines a settling basin for mud, a tapered valve, which will not lock; a large cylindrical strainer, and a casing with an easily removable plate at the bottom. This plate may be taken off without even removing a nut. The nuts are slackened and the plate turned slightly, when the plate and strainer will come down for cleaning. The strainer has a large area, and in practice does not seem to choke the passage of the water. This design has been used extensively by the Brooks Locomotive Works.

American Locomotives on British Railways

Railroad Gazette, June 14, 1901, p. 414.

Regarding the recent outbreak against American locomotives by several members of Parliament and Officers of State in England, the Gazette thus comments: We can form no opinion of the correctness of such statements as were made without particulars. We should not be surprised to know that the American locomotives in the first six months of their performance had cost more for repairs than British locomotives in their first six months, but even 60 per cent. more need not be too much money. We have talked with English inspectors who have been watching the building of locomotives in this country, and we think that their testimony has been that our boiler work is below the British standard. It is commonly known that American locomotives sent abroad have to be taken into the shop to have leaky seams doctored. We do not consider it "patriotic" or "American" to deny this well-established fact. It is more patriotic, as well as business-like, to see that it does not happen again.

German Locomotives at the Paris Exposition

Revue Generale des Chemins de fer, April, 1901, p. 394.

The first of the locomotives treated in this article is a simple expansion engine built by the Borsig works in Berlin. It is one of the standard eight-wheeled engines of the Prussian State Railways with four wheels coupled and a bogie truck in front (4-4-0). It differs only in the superheater from the steam, which has been added.

The boiler is of the Crampton type with an internal diameter of the smallest ring of 54 inches. Near the bottom there is a flue 9 3-4 inches in diameter by which the hot gasses are led direct from the fire box to the superheater.

This superheater, which is the characteristic feature of this locomotive is constructed on the system designed by Wilhelm Schmidt of Cassel. Its principle consists of leading a portion of the gases of combustion, that are taken from the fire-box by means of the flue already referred to, around and through a nest of tubes that are placed in the smoke-box.

This superheater is composed of 60 tubes, 1 3-16 in. inside diameter, forming three concentric nests and bent to conform to the interior of the smoke-box. The upper ends of these tubes are expanded into two steam chambers riveted to the top of the smoke-box on either side of the stack. At the bottom of the smoke-box the tubes forming the inner ring are given an off-set curve by which a sort of chamber is formed in front of the large flue leading from the fire-box. The steam passing through these tubes is thus subjected to the action of the head surrounding them.

The arrangement naturally requires some increase of diameter of the smoke-box as well as a somewhat important modification in the position of steam and exhaust pipes. When the cut-off is set to take place at one-quarter stroke, a point of admission corresponding to the normal working of the machine there is obtained, even with frequent stops, a steam temperature of from 530 degrees to 575 degrees Fahr.

This arrangement is an exceedingly interesting one especially in view of the fact that, for the past two years, an engine equipped with it has been in service on the Hanover lines, and is said to have given satisfactory results, and those which, from the standpoint of economy, are comparable with what has been obtained with compound locomotives. It still remains to be learned what may be the life and expense of maintenance of this superheater in service.

For lubrication, a mineral oil that volatilizes at a high temperature is used.

Another engine is one built by Krauss, of Munich. It is carried normally on ten wheels. Four of these are coupled and are placed beneath the shell. There is a bogie truck at the front and a pair of trailing wheels at the rear. The characteristic feature of this engine, however, is to be found in the sixth pair of wheels, which are placed between those of the bogie and which can be made to serve, at will, as an auxiliary pair of driving wheels in case the train resistance is increased, either at starting or for climbing stiff grades. During the normal operation of the engine the wheels do not rest upon the rails but are raised about 2 inches above them.

Steam Gauge Graduation

Science and Industry, April, 1901, p. 137.

This article is from the pen of Mr. J. A. Grening: The steam gauge is considered to indicate boiler pressure, but strictly speaking, it does not do so, because the boiler pressure, using the term in the true scientific sense, is the absolute pressure above a perfect vacuum. What the steam gauge indicates is really the net boiler pressure, which is the difference between the internal and external pressures. It is often difficult for a beginner to see any good reason why a steam gauge should not be graduated to read to absolute pressures instead of as it does. Looking at it merely from the point of view of abstract science it should read to absolute pressures, but in practice this would be very inconvenient. The function of a gauge is to show the rise and fall of pressure as well as to indicate its amount.

If all the air was pumped out of a boiler the pressure inside would be zero and that outside would be 14.69 pounds per square inch, or equal to one atmosphere; now if air was admitted the internal pressure would rise until it reached an amount equal to the external atmospheric pressure. When there was no pressure within, the external pressure tended to collapse the shell; as the internal pressure rose this tendency diminished, and at the point where internal and external became equal this tendency disappeared entirely. If water be now admitted and steam generated the equilibrium of the two forces is disturbed, and the internal pressure being in excess of the external tends to burst the boiler. It is this tendency, expressed in pounds per square inch, this difference between the internal and external pressures, which is important to know by a glance at the gauge dial without the necessity of subtracting 14.96 pounds in order to determine it. The gauge which reads to absolute pressures would indicate the pressure within the boiler, but would not show the actual pressure tending to burst the shell. The absolute pressure is always and all the time opposed by that of the atmosphere without, and to that extent exactly it assists the boiler to resist the bursting pressure within. English-speaking nations use the pound per square inch for steam pressure indication, but nearly all the other civilized nations use kilograms per square centimeter. This latter is equal to 14.22 pounds per square inch and is a very close approximation to "one atmosphere." If then the pressure registered on such a gauge be seven atmospheres it is only necessary to multiply 7 by 14.22 to express it in figures in accordance with the British system of weights and measures.

Locomotives for Trains Run at Very High Speeds

Bulletin, International Railway Congress, April, 1901, p. 659.

Progress realized in the construction of locomotives attaining very high speed (56 miles per hour and upwards), and especially in the motive power of fast trains heavily laden or running over lines with steep gradients. Use of the compound engine.

CONCLUSIONS.

The Congress notes the important statements contained in the reports; it considers that the very great speed now common requires the use of extremely powerful locomotives to enable the gradients to be ascended without too great reduction in speed. It finds that four-wheel coupled locomotives are in general use for very fast trains, and that there is a tendency to use six-wheel coupled locomotives for certain fairly fast trains. It finds, moreover, that the compound system is coming into greater use for express trains.

Swiss Locomotives at the Paris Exposition

Revue Generale des Chemins de fer, February, 1901, p. 165.

The locomotives exhibited in the Swiss section at Vincennes were from the Winterthur works and were four in number. All but one were compound locomotives for the standard gauge track. These engines were very carefully designed and were exceedingly simple in appearance. One of them was an eight-wheeled engine with four wheels coupled and a bogie truck in front that was built for the Northern Railway of Switzerland. The engine has a number of peculiarities. The frame of the front truck is between the wheels and has a lateral motion that is regulated by semi-elliptic springs. This truck is attached to the main frame of the engine by a center plate and the weight of the engine rests upon it by means of two hemi-spherical pivots that are set on either side of the center plate and which can slide on the frames of the truck.

The driving boxes are provided with semi-elliptic springs placed beneath them and connected by equalizers having arms of unequal length. The spring hangers are also provided with helical springs.

The crownsheet is held by stays, the two front rows of which are so arranged that they are free to yield to the movements of the sheets caused by expansion. The boiler has no dome. In accordance with the general practice of the road the steam pipe is horizontal, perforated and set close to the top of the shell. The throttle is of the Crampton type and placed in the smokebox.

The engine is of the two-cylinder type with the cylinders set between the frames. The pistons of these cylinders drive a crank axle of nickel steel. The connecting and side rods are of Martin steel. The guides are double. The pistons are of the Swedish type, that is of a plain conical disc and each is fitted with an extension piston rod.

The valves are located above the cylinders and work on seats that have a downward inclination from the center toward the outside. The motion is between the frames; but as the space available on the crank axle for the eccentric was very limited, this part of the movement is placed outside in the form of a return crank, which drives one arm of a rocker, to the other of which, located between the frames the link is attached.

The reversing gear is so arranged that cut-off is obtained later in the large, than in the small cylinder. This is done by using lifting arms of unequal length.

When the engine is working in full gear, either forward or back, each cylinder takes live steam and the exhausts work in-

dependently of each other. When the point of cut-off has been changed to about 70 per cent. of full stroke, the starting valve is automatically reversed and the locomotive works as a compound.

The second engine was a three-cylinder compound of a type corresponding to the American mogul and was built for the Jura-Simplon Railway. It is intended for hauling express passenger trains over a comparatively steep line, and, in case of necessity, for heavy freight service.

On account of the short turn-tables, the wheel base had to be reduced as much as possible and the use of the bogie truck in front abandoned. Owing to the tractive power which it was desired to develop and the necessities imposed by the permanent way clearances, the use of the two cylinder type of compound was abandoned for that of the three-cylinder. The high pressure cylinder is between the frames and the low-pressure outside. This arrangement makes it possible to dispense with the starting valve that is needed when the two-cylinder type is used.

The front truck axle is radial of the Adam type, and is drawn back to the normal position by inclined planes.

The valves are balanced in the American way as modified by Herr von Borries, in which the joint is made by two concentric segments of rectangular section held against the wearing plate by helical springs. The valve motion is also so arranged, like that of the first engine, that a cut-off is obtained later in the small than in the large cylinder.

The third engine is a four-cylinder compound with the same wheel arrangement as the first. The bogie truck is built very much along the lines of the American construction except that it has the semi-elliptic springs for limiting the side motion as already specified for the first engine. The high pressure cylinders are outside the frames and are set back between the truck and the front driving axle and are coupled to the rear wheels. They are inclined to the horizontal about one in forty. The low-pressure cylinders are between the frames and are in a line with the center of the truck. They are cast in one piece. They are also inclined one in forty to the horizontal and are coupled to the forward axle which is cranked. The ratio between cylinder volumes is 1 to 2.38.

For one series of machines the crank angle of the outside cylinders was 180 degrees, so made for the sake of balancing the reciprocating parts. For another series, in order to facilitate starting, this angle was reduced to 135 degrees.

Starting is effected with live steam admitted to the low-pressure cylinders by means of a value, attached to the lifting shaft, that opens when the motion is in the extreme of front and back gear.

The fourth engine was also of the mogul type (2-6-0) and was built for the Ethiopian Railway, where there are grades of 3 per cent. The boiler and mechanism offer no marked peculiarities, as it is a type of simple engine similar to many that have been previously constructed by the Winterthur works.

Use of Steel and Ingot Iron in Locomotive Construction

Bulletin, International Railway Congress, April, 1901, p. 667.

A. Use of steel and ingot iron, rolled and forged, and steel castings in the construction of certain parts of locomotives (moving parts, boilers, fireboxes, etc.). Specifications and test. Means of ascertaining the presence of unseen flaws.

B. Use of steel and ingot iron in wagon (car) construction, especially for the buffing apparatus and drawgear. Specifications for manufacture and methods of testing.

CONCLUSIONS.

Steel is now exclusively employed in America for making boilers and fireboxes, at least for locomotives intended for use in the States. In other countries, almost all boilers are steel, but fireboxes are seldom made of this material. Opinion is divided as to corrosion and the relative life of steel and wrought iron boilers; but it seems proved that the life of steel plates is not shorter than that of iron plates. The tires of locomotives, carriages and wagons are now always steel. Straight axles are almost exclusively steel. Cranked axles are always so. Steel and nickeled steel are used for the working parts. Cast steel is commonly used in locomotives, carriages and wagons as a good substitute for parts that used to be of cast iron, and to replace some forged parts, such as wheels, fittings, and even things that used to be of bronze.

Petroleum Residue as Fuel for Locomotives

Trade Journals' Review (Manchester, Eng.), May 15, 1901, p. 105.

A German firm has recently designed a new locomotive in which petroleum residue is used for fuel. The residues were enclosed in a reservoir of 300 litres capacity, and maintained at a temperature of 45 degrees, an auxiliary boiler being utilized at the time of starting. The boiler of the locomotive rapidly attains its normal traction pressure—about 120 lbs.—under the influence of the burners at half-cock. The trials were made on a line of 19 1-2 kilometers in length. The train weighed 65 tons, and the normal pressure of steam was 8.2 atmospheres. The average speed was 20 kiloms. per hour, with a consumption of 648 litres of water and 60 litres of fuel. Under these conditions the consumption of fuel per train kilometre is about 3 litres, at a cost of about one penny.

Car Equipment, Appliances and Related Matters

Properties of Waste Packing

Proceedings, Western Railway Club, May 21, 1901.

Mr. T. H. Symington recently read a most instructive paper regarding waste packing before the Western Railway Club. By a series of tests he tried to ascertain which was better and cheaper—cotton or wool waste. He experimented with 29 different kinds of wool waste, and 17 of cotton. His absorption test for the wool showed an average of 325 per cent., and for the cotton 491 per cent. The expansion test gave the wool an average of 22 per cent. and the cotton 15 per cent. In the capillary test the wool averaged 88 per cent., and the cotton 131 per cent. In the height of capillarity test the average height for the wool was 1.28 in., and for the cotton 1.72 in. While the absorption per cent. of capillarity of the wool is much less than the cotton, its expansion is considerably higher; and, this is important, as it means elasticity, which is so very essential. Cheap waste on account of its short fibre and shoddy material is reduced in one year to a pulpy, inert mass. Long fibre wool retains its form and elasticity. The tests seem to show that the capillarity depends on the length of fibres, as the oil feeds through each individual fibre. If cotton waste could be made to remain in its original position it would appear to be as good as wool; but when used in axle boxes it rolls up and leaves parts of the journal exposed.

Cavanagh System of Car Record Keeping

Railway World, May 25, 1901, p. 574.

The Big Four has in operation in its car-service office at Indianapolis the Cavanagh system for keeping records of its own and foreign cars, superseding the old system of book records. It consists in the use of a case in three sections placed upon a table three feet high. The sections are divided and subdivided in a way which permits filing blocks by terminal numbers, each block representing a car and holding three to five years' record. The clerks using the Cavanagh system can handle a larger number of cars than heretofore, much more expeditiously and accurately, without the fatigue caused by the old system. The clerk at the case can reach each compartment while sitting on a revolving stool, the part of the table immediately in front of the back section having a space cut out to enable him to get closer to the case.

Railway Car for the King of England

Railway and Engineering Review, June 15, 1901, p. 387.

The King of England has recently had constructed at the works of the Compagnie Generale de Construction, at St. Denis, France, a new corridor railway car of Continental design, weighing 37 tons. The body of the car is constructed principally of teak, varnished in a sombre shade. Press dispatches give the following particulars regarding the equipment of the car: "The royal compartments include two bedrooms—one for the king and another for the queen—two dressing-rooms and a salon in the centre. There are in addition two compartments for personal attendants. The car is liberally decorated with handsome wood carving and plush and leather trimmings. The ceilings are artistic in design and are painted throughout in light colors. In two of the compartments they are in embroidered silk. The car is fitted with Stone's system of electric lighting. All the windows are provided with two blinds—a dust blind and a silk one, and the fixed windows are of double glass to meet the requirements of winter. No space is wasted and in nearly every room there is a variety of practical and handy arrangements intended to make the most of the accommodation. The car is heated by warm water, which can be heated in two ways—by a coke fire or by steam from the engine. A door at one end of the corridor permits communication with a dining or sleeping car, and the king's coach is so fitted with brake appliances, etc., that it can travel over any railway system on the Continent that is standard gauge."

Unique Method of Heating Street Cars

Railway Herald (London), March 23, 1901, p. 3 .

A new method of heating street cars has been adopted in Christiana and Stockholm. The apparatus consists of long perforated boxes, one under each length of seats, one or both sets of apparatus being in operation as required. The boxes are filled with red hot coal briquettes, prepared so that no smoke or smell is emitted. Iron sheeting is so arranged under the seats and to allow the fumes to escape into the open air. On fresh air passing through a ventilator placed under the coal box at the bottom of the car the hot combustible gases pass through this channel of iron sheeting throughout its entire length, diffusing a steady heat into the car through a set of perforated iron plates between the legs of the seats. The speed of the car causes sufficient draught so that the briquettes are completely consumed. At 14 degs. C. of frost, a temperature of 60 degs. C. is obtained. This method is supplanting the use of electric heaters on the Christiania and Stockholm lines and has been found less expensive and more satisfactory.

Shop Practice, Machinery and Tools

Caskey Portable Pneumatic Punch

Iron Age, June 6, 1901, p. 13.

This punch, built by F. F. Slocomb & Co., of Wilmington, Del., was originally designed by a shipbuilding firm for use in torpedo boat construction. The original tool constructed for this purpose is still in use, and did 90 per cent. of the work on the two boats for which it was intended. Some improvements appear in the punch as now built. This punch is highly convenient for work that cannot be reached by the power punch, or on work that must be carried to the punch. The tool is very simple in construction and possesses great durability. The chief distinctive feature is a hollow piston containing oil, within a prolongation of which a stationary tube is adapted to telescopes, the oil being thereby forced into and through the tube and thence upon the plunger, where it exerts accumulated pressure. The air which drives the piston during the stroke is utilized to drive it back for another, being finally expelled through the exhaust during the next succeeding stroke. This, as will be apparent, effects an important saving in the amount of air used. The punch is built in four sizes. The smallest, or size o, weighing 28 pounds, is adapted to work up to 3-16 inch; size 1, shown in cut, weighs 145 pounds, and will punch up to 3-8 inch; sizes 2 and 3 are adapted for punching 1-2 inch and 5-8 inch plates, respectively.

The Fate of a Draughtsman

American Engineer and Railroad Journal, March, 1901, p. 87.

The Engineer says: "In too many cases the drafting room is a side track into which good men hesitate to enter." In a single week the Engineer's correspondence included cases which it thinks justifies its view. The first disclosed a vacancy for a first-class draughtsman with technical education and training, hours 7 a. m. to 6 p. m., half an hour for lunch and salary $80 per month. The second required an exceptional man with college education and shop apprenticeship, and one thoroughly familiar with locomotive design and foundry work, salary being the same as the first, but it was expressly stated that there was no hope of advancement. The third was for a chief draughtsman at $100 a month. This was clearly stated to be the limit of the position and the salary.

It is pointed out that the very demand for draughtsmen indicates a solution of the whole difficulty. A very strong plea is entered for the draftsman. The editorial writer says: "Give men a little hope that they may go higher if they can show their ability." One day each month given to a draughtsman to visit other shops or places where the results of work are in use, would pay. Informal reports of such days, with suggestions, would be valuable to all concerned. This day should not be considered as a vacation, but as one of the draughtsman's duties. "Because of his training for accuracy, his disinterestedness as well as his tendency to see things for himself rather than take the reports of others, the draughtsman should be a most satisfactory investigator and observer. He will do much better work at the table for being occasionally sent away from it on errands of investigation." It is not, however, the writer's purpose to sympathize with the man who complains that there is no outlet for him. "A young man who is determined to rise will not be kept back even by the drafting room. It is his own fault if he does not find something on the road that needs to be done, and make known his ability to do it."

Electric Equipment, Machinery and Appliances

Manchester and Liverpool Electric Express Railway

Transport (London), May 24, 1901, p. 428.

In answer to criticisms as to the safety of the "mono-rail" system, Mr. Balfour Browne, K. C., recently laid great stress on the fact that before a single passenger could be carried on the line the promoters must give a month's notice to the Board of Trade, who would then have an opportunity of thoroughly investigating the arrangements in detail, and unless the Board of Trade were absolutely satisfied with its safety, the line could never be opened. He supported his contention by reading extracts from the general law as regards the regulation of railways. The chairman asked the promoters if they guaranteed that the centre of gravity of the fully loaded car should be at least 12 inches below the top rail. This they were prepared to guarantee as the minimum.

The following addition to clause 56 was brought up by the promoters and agreed to by the committee: "And the cars and other vehicles to be used on the railway shall be constructed so that when the car or other vehicle is fully loaded the centre of gravity shall be at least 12 inches below the upper surface of the uppermost rail."

Elberfeld-Barmen Suspended Railway

Western Electrician, May 11, 1901, p. 316.

Mr. Guenther, Consul-General of Frankfort, Germany, reports that on March 1st, the electric suspended railway across the valley of the River Wipper, from Elberfeld to Barmen, was opened for passenger traffic, and the result is said to be highly satisfactory. Although the crowds were immense and all the cars filled to their utmost capacity, the trains ran smoothly, and no accidents occurred. The cars did not swing at all, even where the curves were sharpest, and they ran into the stations in a quiet way. Ingress and egress are effected in a moment. The surface railway makes the trip in 25 minutes, while the suspension railway accomplishes it in half the time, and a still further increase of speed is contemplated. The fare is 10 pfennigs, or equal to 2.38 cents.

Power by Carloads

Pan-American Pamphlet.

Thomas A. Edison has invented a new storage battery which is said to be his most important invention since he discovered the incandescent light. It is intimated that several fields will be revolutionized by its introduction, for the new battery combines the advantages of durability, effectiveness and lightness. It is predicted that a new art of electrical propulsion and navigation will result. Electric light will be cheapened, and electricity will supersede steam power in many factories. The new battery may be the instrument which will carry the stored energy of Niagara around the world in carloads. Its use will result in lighter automobiles, and make electricity more available on ships. The new battery is made up of cells known as nickel-iron cells, and the electrolyte is potash. The charging and discharging rates of the cells are alike. The cell may be charged at a normal rate in three and a half hours, or it may be charged at a high rate in one hour, with no detriment, except for a somewhat lower electrical charge efficiency. The cells can be subjected to a very low temperature without detriment, and the electrolyte-potash does not attack any ingredients of the cell, nor are any of the latter soluble therein. The new battery may be seen in the Electricity Building at the Pan-American Exposition.

The Solenoid

Model Engineer and Amateur Electrician, June, 1901, p. 243.

A magnet of the ordinary type is never employed by intelligent designers for actuating mechanism through a considerable range of movement, because the reluctance of the air-gap in such a case is so great that most of the magnetic lines never reach the armature, but turn back to the yoke outside the exciting cells. An arrangement most commonly used for this class of work is the solenoid, or magnet coil, with a plunger core, as illustrated in the accompanying illustration. This is about the worst form possible, from an economical standpoint. The magnetic circuit is composed chiefly of air, and the result is that an enormous expenditure of electrical energy in the winding produces an insignificant amount of mechanical work at the plunger.

Storage Battery Traction

Electrical Review, June 8, 1901, p. 715.

Electric traction by means of accumulators is again attracting interest, due to the attention aroused by Mr. Edison's type of storage battery. If this new type of battery is what it is claimed to be, the automobile problem is practically solved. Still, operating cars upon tracks by means of storage batteries is not as simple as it seems. A car provided with accumulators and motors will undoubtedly propel itself. Such cars have the advantage over all other self-propelling vehicles. However, wherever the trolley system is possible, storage battery cars are not needed. This is evident, because, even with a perfect storage battery the cost of transporting the battery itself must always be borne. The accumulator is of vital importance in traction work, if it is installed in the generating station or in substations, and not on the moving cars. Only in streets of the great cities is there cause for objection to the overhead trolley, and in these, the traffic and patronage are so great that dividends may be earned upon conduit systems in which the fixed charge for interest is relatively high. The storage battery car is thus limited to certain short and little-travelled lines in cities where municipal considerations prevent the installation of the overhead system, and where the underground system would be too expensive. The value of the storage battery in electric traction service is now a matter of history. However, there have been no conspicuous successes of accumulator installations in which the battery is carried on the moving car, whereas, there have been many successes when the battery is placed somewhere along the line, and used as a flywheel to steady the system, and as a storehouse of reserve power. While storage batteries seem destined to become a potent factor in the future large and ever increasing operation of electric railroads, it is safe to say that the batteries will not be carried in the cars.

St. Paul's and the "Tube"

The Chronicle (London), June, 1901.

St. Paul's Cathedral is, it is feared, somewhat endangered by one of the proposed new tube railways, and the dean and chapter are up in arms. The proposed electric line, known as the Piccadilly and City Railway, will pass under the south side of St. Paul's churchyard, and unless very considerable precautions are taken to prevent any possibility of danger to the great mass of Wren's structure, the cathedral authorities will range themselves in uncompromising opposition to the scheme. There was trouble enough when the cathedral was built to secure a good foundation, and it is seriously feared that the construction of a tube and the constant vibration almost immediately beneath the sanctuary may seriously endanger the foundations. The dean and chapter have just got permission to be represented by counsel before the Parliamentary Committee which will consider the scheme.

Conducting Transportation

Ticket Examinations

Railroad Gazette, April 19, 1901, p. 271.

"Surprise checking" is taking on new horrors. On the Northern Pacific, according to a St. Paul paper, the company has for some time employed three "ticket exchangers," who board passenger trains at any point where they happen to see fit, and check up the accounts of the conductors, examining the tickets in the hands of the passengers; but recently the management of the road has gone a step further and appointed two train collectors who not only examined the conductor's work but take the whole of it into their own hands for the trip. The collector, on entering the train, requires the conductor to go through the cars with him and explain all the hat slips and other transportation checks in the possession of the passengers. The conductors, according to this account, felt greatly chagrined at this implied imputation on their honesty; and the informant of the reporter exclaimed triumphantly, that in the four months since the collectors were put on, no conductor has been caught in wrong doing. The Gazette sympathizes with these honest conductors, but the only consolation it can offer is to remind them not only that "an honest man will bear watching," but to submit to watching all the time, because it is only by watching all of a class that the dishonest few can be detected. How much worse is the surprise checking for a conductor than for a ticket agent or a bank cashier?

[One feature which is often lost sight of in the checking of conductors, is the inconvenience to passengers, who have sometimes to show tickets several times over. The Railway and Engineering Review, Feb. 2, had an article, "Consider the Day Coach Passenger" (Digest for March, p. 105) in which the Review speaks of "badly arranged

layover points for crews, or where through runs are divided up among several crews which necessitates the repetition of ticket examination, which is not only a needless but often a positive nuisance." The contract which is entered into between a passenger and a railway company is transportation for a given sum of money. The ticket is merely a convenient means of identifying those who have paid, but the ticket is not part of the contract, and the less fuss there is with tickets, the better pleased passengers will be.—Eds. Railroad Digest.]

Burlington to Abolish Train News Agents

Railway and Engineering Review, May 11, 1901, p. 301.

Effective July 1, the management of the Chicago, Burlington & Quincy Railway will abolish the institution of train news agents, which have hitherto been carried on its trains. In their place the now very general eastern custom of only allowing news agents on the trains at division points, will be followed. While this plan has been adopted very generally on roads east of the Mississippi river during the past year, the Burlington is the first large Western road to abolish the train news agent, but it is quite likely the example will soon be followed by other lines West as well as East, for it is now quite generally appreciated that this individual is more of a nuisance than a convenience.

Railway Trouble in Great Britain

Railway Age, April 12, 1901, p. 417.

English railway managers are confronted by competition among themselves and by demands for lower rates and for higher wages; and while they do not, like ours, have to contend with the varied requirements of State as well as of national governments, they have to meet the problems of costly fuel and growing foreign competition. The public seems disposed to complain that some of the competing lines run too many trains for profit to accrue, and that in the end the public has to pay for the losses thus incurred; in other words, that if there were fewer trains there could be lower fares—which is most decidedly a debatable proposition. It appears that the British system needs reforming, and the remedy suggested is "the nationalization of the railroad system of the Kingdom." As the system covers but 22,000 miles, the consolidation would seem quite possible to those in America who effect much larger amalgamations; but in England it is looked upon with apprehension. A novel compromise plan is that Parliament should declare that every railroad admit to its board at least 25 per cent. of members who are not shareholders in it or any rival undertaking, these members to be elected by the commercial, industrial and agricultural associations of the districts served, one or more also to represent the employes of the respective companies. These members would see "that no policy was pursued inimical to" the employes and the users of the railways, and especially to ascertain if the service was economically performed in the interest of the public." It is not probable that the plan will be seriously considered in Great Britain.

Medical and Surgical Matters

International Association of Railway Surgeons

Railway Age, June 14, 1901, p. 659.

The fourteenth annual convention of the International Association of Railway Surgeons was held at the Plankington Hotel, Milwaukee, Wis., on June 10, 11 and 12. The attendance, though not as large as in previous years, was of encouraging proportions and composed of eminent physicians. The programme was a varied and extended one and contained a number of papers of great interest to railway officials who are not familiar with the minutiæ of surgical affairs. The meeting was presided over by Dr. H. L. Getz, chief surgeon of the Iowa Central. The election of officers resulted as follows:

President, Rhett Goode, Mobile, Ala.; vice-presidents, J. A. Barr, McKee's Rocks, Pa.; W. M. English, London, Ont., Canada; Lester Keller, Ironton, Ohio; B. Saunders, Fort Worth, Texas; S. R. Miller, Knoxville, Tenn.; Benjamin Thompson, Tama, Iowa; A. L. Peterman, Parker, S. D.; secretary, Louis J. Mitchell, Chicago, Ill.; treasurer, James A. Duncan, Executive Board—J. N. Jackson, Kansas City, Mo.; C. R. Dickson, Toronto, Can.; L. Worsham, Evansville, Ind.; W. S. Hoy, Wellston, Ohio; D. S. Fairchild, Clinton, Iowa; W. D. Middleton, Davenport, Iowa.

[Dr. Dickson has also been appointed a sub-editor of the *Railway Surgeon*, and has been placed in charge of a department to be established for the purpose of dealing with emergency and first aid. This will, no doubt, be a most valuable addition to the pages of the *Railway Surgeon*, and we are glad to be able to record this evidence of the growing importance of the first aid movement on railways.—Eds. Railroad Digest.]

Antidote to Mosquito Poison

Consular Reports, May 17, 1901, p. 5.

Dr. Voges, according to German papers, has found a remedy for mosquito bites. He states that he discovered it by accident during his trip to Paraguay to study the pest. He had been supplied with all sorts of remedies. Among them was "naphthaline," an article of no value with which to fight the mosquito, but on using it for mosquito bites, he was surprised at the result. It neutralizes the poison, even when the spot bitten is greatly inflamed. If fresh bites are rubbed with naphthaline, no swelling follows. The professor considers naphthaline almost a specific against mosquito poison.

"First Aid"

International Journal of Surgery, March, 1901, p. 95.

The Journal says editorially that the benefits of the first aid packets have become so apparent that many corporations, factories and shops consider it necessary to provide them. The idea should be, not to see how many useful articles may be crowded into a small packet, but to see how few we may complete the packet with, and make it meet the needs of first aid work. Medicines and narcotics have no place in a first aid packet. Employes should be instructed on the limits of "first aid," and made to understand the necessity of consulting a surgeon at once. The practice of using unclean dressing material in first aid work is very dangerous indeed, and one case so dressed may cost a corporation a hundred times more than it would cost to equip an entire line with "first aid" packets. Even in far off Siberia on the Great Siberian Railway, the officials have provided "first aid" equipments. Instructions to employes should be brief but practical. The selection of one man as dresser, with one or two assistants, is the proper course to follow. Intelligent "first aid" not only saves money for the corporation, but also indicates close relations between officials and employes, and that cleanliness, personal purity and religious work go hand in hand with this great work of relief. To secure uniformity on all "first aid" points, a complete surgical service with a chief surgeon is a necessity.

[The emergency packet carried, we believe, on the Pennsylvania Railroad, contains: One rubber compress, one ounce of absorbent cotton, six rolls of bandages and one pyramid of pins. The box is made of tin, $4\frac{1}{2}$x$6\frac{1}{2}$x$3\frac{3}{8}$, and contains brief directions on the cover for the use of the contents in case of accident.—Eds. Railroad Digest.]

Coal in the Air

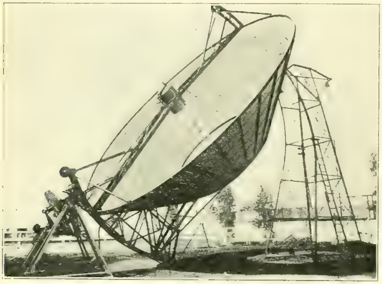
A hater of smoke recently made the statement that the smoke cloud of London is plainly discernible at Lockinge, 64 miles distant, and in its passage leaves a distinct residuum of black upon the soil. London's black cloud is estimated to represent 6,000 tons of coal in suspension every day.—*Locomotive Engineering.*

Miscellaneous

A Curious Solar Engine

Blacksmith and Wheelwright, May, 1901, p. 591.

An interesting machine has just been erected in one of the vacant pens of South Pasadena Ostrich Farm, near Los Angeles, the chief city of Southern California. Nearly two thousand mirrors, each three and a half by twenty-four inches in size, project the rays of the almost perpetual California sunshine upon a boiler thirteen feet and six inches in length, holding a hundred gallons of water and eight cubic feet of extra space. This boiler is made of fire box steel, covered with an absorbent material. Steam is conducted from the boiler to the engine



by a phosper-bronze flexible pipe. This extraordinary machine turns as the sun ascends the heavens, moved by clock-power, and the heat of the sun develops in one hour one hundred and fifty pounds of steam pressure from cold water. It is the result of a series of experiments, and its object is to furnish to those resident in southern latitudes, desiring power, a substitute for coal, oil, wind and electricity. It operates a fifteen horse-power engine to pump water for exhibition purposes; and is virtually a step forward in that great problem that is interesting the minds of inventors—how to harness the sun's rays to the service of mankind.

Illinois Central Pension Plan

Railway Journal, June 1901, p. 13.

The Illinois Central Railroad has adopted a system of pensioning its employees. All officers and employees who have attained the age of seventy years shall be retired and those who have been in the company's service ten years shall be pensioned.

Locomotive engineers and firemen, conductors, flagmen and brakeman, train baggagemen, yard masters, switchmen, bridge foremen, section men and supervisors, who have reached the age of sixty-five years may be retired. Such of them as have been ten years in service shall be pensioned when retired. Officers and employees between sixty-one and seventy years of age, who have been ten years in the service and who have become incapacitated, may be retired and pensioned. In case an employee between sixty-one and seventy years of age claims that he is, or should his employing officer consider him incapacitated for further service, he may make application or be recommended for retirement, and the Board of Pensions shall determine whether or not he shall be retired from the service. The sum of $250,000 has been set apart as a pension fund; in addition, the company will each year appropriate an amount not to exceed $100,000. As a result of the adoption of this splendid policy the company has also decided to employ no more inexperienced men under 35 years of age and no one under 45 years of age. This plan was adopted at the meeting of the Board of Directors April 24, but did not become effective till July 1, 1901.

Mixture for Preserving Floors

Power, May, 1901, p. 11.

The *La Revue Technique* gives the following as an excellent preparation for treating the wooden floors of engine and dynamo rooms. Five parts of beeswax and one part potash are boiled in sufficient water to thoroughly dissolve the potash. The mixture should be boiled until the water combines completely with the wax. The mixture is then taken from the fire and a quantity of boiling water is added, stirring constantly at the same time. It will be found if the process has been conducted properly, that 225 parts of water can be added to the original quality, and the substance will still retain its homogeneous character, no clear water appearing. The mixture is then heated for five or six minutes, but is not allowed to boil. It is then taken from the fire and stirred vigorously until cool. This forms a sort of cream, which gives a brilliant polish to wood in a very little time. It should be applied with a piece of linen, and the wood then rubbed with another piece of the same material.

Nothing In It

Machinery, April, 1901, p. 250.

Machinery takes the Electrical Review to task for the latter's advocacy of international secrecy regarding manufacturing and the processes thereof. The Electrical Review thinks that the United States has advanced so marvellously, not on account of the American disdain of secrecy, but in spite of it. It says that on account of the keen competition now existent, it behooves America to cease allowing Europeans to make inspections throughout the industrial concerns of her land. Machinery says that the Electrical Review's advice and fear is based on the assumption that commercial success in manufacturing primarily depends on secrecy. This proposition is reduced to an absurdity by Machinery, when it says that an imitative rival will find means of obtaining the desired knowledge despite the closest secrecy, which his opponent may employ. The inevitable conclusion that such methods lead to is that the manufacturer should not advertise nor manufacture for sale, but should place his products in an hermetically sealed safe, or hide them away in some unexplored land. This policy might be all right for those who are in business "for their health." Machinery believes that a policy of secretiveness far from being the cause of the impetus to prosperity is the surest guarantee of apathy and decay.

[Perhaps the position taken by Machinery may be aptly stated by quoting a few lines written by Kipling, from a poem called "Kitchener's School":—Eds. Railroad Digest.]

—"But I think one new thing
That the magic whereby they work their magic—
Wherefrom their fortunes spring—
May be, that they show all people their magic
And ask no price in return;
Wherefore since ye are bound to that magic
Oh, Hubshee, make haste and learn."

Mending Castings

Foundry, March, 1901, p. 35.

The "Burning or Mending of Castings" was a paper read by Mr. Ed. B. Gilmore, before the Foundrymen's Association. He says that viewed from the standpoint of theory, it is impossible to mend a casting by burning, but good results are not denied in practice to those who go about the business understandingly. Mr. Gilmour gives his own experience with a marine cylinder; he says a piece was broken from a sharp point of the exhaust core, which left

a hole clear through to the outside of the casting. To successfully close up this hole and so save a very valuable and expensive casting, the following procedure was followed: The casting was put upon a car with defective side uppermost. Loam molds were made to cover this hole; also a loam mold was made to fit the inside of the casting at the same place. Then the molds were taken back, dressed up, and given a coat of blacking, thoroughly dried, after which they were tightly secured to the casting. A runner was made to take off the metal poured, and the overflow was caught in a ladle conveniently placed. The whole thing was then put into the oven. It is to this heating of the casting up to the required temperature that Mr. Gilmour ascribes the success of such ventures. The casting should be heated to at least 600 degs. F. To do this the oven should be heated in the usual manner with a coke fire; about an hour and a half before the time for burning the casting the fire in the oven should be filled with soft wood, the supply of which should be kept up until ready to begin the work of burning the casting. This latter will raise the temperature of the oven to the desired point. In order to be sure as to the temperature a piece of lead may be laid upon the car; if it melts a temperature of 612 degs. F. has been reached; if tin be used, its melting will prove that a temperature of 442 degs. F. has existed in the oven. When all is ready the metal should be poured very hot and should have been so mixed as to secure the very softest nature of iron, so as to keep down the shrinkage and make the work of chipping and machining easy. Dry charcoal blacking should be used to cover the cast, and the whole thing run back into the oven to cool gradually. Mr. Gilmour gives details of some other operations, and advises the use of one large ladle in preference to several small ones for bringing the metal into use hot. The larger quantity holds its high temperature longer. The question is often asked, "Is the casting as strong after being burned as it was previous to being broken?" Mr. Gilmour answers by saying: "In a great many instances it is stronger, as very often there is a contraction strain upon the casting which has been relieved by the breaking, and when properly mended it should be certainly as strong."

Ferrell Process of Wood Fireproofing

Journal of the Franklin Institute, March, 1901, p. 161.

Recently at the Franklin Institute, a paper was read by Mr. Joseph L. Ferrell, M. E., in which he discussed recent developments in the fireproofing of wood. After reviewing the old process of steaming, suction, and direct application of pressure, he showed the causes why these methods failed of their purpose. The form of cylinder used did not allow of high pressure; consequently, the wood was never thoroughly saturated with the chemical used. It also lost its color and flexibility and corroded metals when in contact with them. Add to this that the operation was lengthy and tedious, and far too costly for universal application, and the reasons of failure are patent.

Mr. Ferrell showed that the keynote of success in wood fireproofing lies in the complete saturation of the wood with the chemicals, and in such a manner as to render the immutable fixing of the chemicals in the wood. How to do this, in short time and with little expense, and without injuring the wood in any way, is what Mr. Ferrell claims for his process. He does not disclose the kind of liquid he used, but whatever it may be, it is forced into the wood under high pressure.

Accompanying the reading of the paper were photographs showing the difference in fire resistance of ordinary wood, and that which had been treated by the new process. Two small houses, one built of ordinary wood, the other of wood fireproofed by the new process, were simultaneously set on fire by means of kindling wood placed along the sides of each. In 18 minutes the one built of ordinary wood was entirely destroyed, while the other was unharmed. Mr. Ferrell claims he has practical proofs of the utility of his process, and predicts a new industry of vast proportions, which will be heralded by the further advancement of the patents for which he has applied.

Covering Capacity of Lampblack

The Painters' Magazine, April, 1901, p. 276.

Mr. Joseph Griggs says that lampblack, when pure and highly calcined, is the densest and one of the bulkiest pigments. One pound of dry lampblack will produce from 3½ to 4 pounds of lampblack in oil in paste form. To prepare this paste for spreading will require one-half gallon of oil and driers, producing nearly one gallon of black paint. No other pigment save carbon black will accomplish this. For a good stout black paint, a painter will thin down ten pounds lampblack in oil with six and one-half pints of pure linseed oil and one and one-half pints of brown japan or strong liquid drier, which will give him two gallons of paint, weighing 8¾ pounds per gallon. He has in each gallon five pounds of lampblack in oil, or from one and one-quarter to one and one-third pounds of dry lampblack. One gallon of this will readily spread over and cover under the most adverse conditions, 600 square feet of ordinary surface and it will require about four hours to accomplish this under favorable conditions, when the work can be reached from the ground without ladders or scaffolding. Thus one pound of lampblack in oil thinned as above, will cover at least 120 square feet of surface and require the services of a skilled workman from forty-eight minutes to one hour at most, always provided that the work may be reached without difficulty.

Imitation of Wood in Castings

Trade Journals' Review (Manchester, Eng.), May 15, 1901, p. 106.

A new process now used in Germany of imitating wood carvings, etc., in plaster, bronze, and other materials, is said to supersede the old way of painting and lacquering, in so far as it reproduces perfectly the fibres and pores of the wood models. The model, which is best made from porous oak, is covered pretty thickly with a solution of 2 per cent. collodium, and when this is dried up it leaves the usual dull and porous appearance of the wood unaltered, but the model is perfectly oil proof, and the casting is proceeded with in the usual way

Schram's Water Gauge

Engineering (London), May 3, 1901, p. 585.

Schram's water gauge is one of those in which the rush of steam and water, which usually follows the breaking of a gauge glass, is prevented by self-acting valves, which immediately close both the steam and water passages. When the valve is open, as it ordinarily is, the course of the steam is through the slots cut in the circumference of the head, then through the four holes in the interior of the hollow spindle; and finally, out at the other end. A light spring keeps the valve in this position, but should the glass burst or be broken the spring gives way and the valve seats itself. The acting surface is a sharp ring on the underside of the head, and this takes its bearing on the flat surface opposite to it. The ring is made narrow so that it may cut into any deposit that there may be. After a new glass has been fitted the valve is forced back by the screw spindle, and is held back by the spring. Of course the valves will seat themselves when the glass is blown through, unless the screwed spindles are first advanced to hold them back. There are four slots in the end of each valve to allow steam or water to pass when the valve is against the screwed spindle. This water gauge is of Canadian origin.

A Common Carrier not a Fire Insurance Co.

Railway Age, April 5, 1901. p. 397.

Is a railway company liable for damages caused by the burning of baggage left at a station which was destroyed by fire communicated by sparks from a locomotive? The Supreme Court of Missouri says no; holding that while the statute making such company responsible for the destruction of contiguous property by fire set from locomotives is constitutional, it does not apply to goods in possession of the company for transportation or held for delivery. In other words, a common carrier is not a fire insurance company.

New Railway Brake in Belgium

Consular Reports, April 30, 1901, p. 2.

U. S. Consul Winslow writes from Belgium as follows: Experiments are being made with a new brake for railway trains, which would reduce the running time more than one-third at a speed of 80 kilometers (49.7 miles) per hour. It is known as the Luyer's system, and consists principally in a friction pulley fastened to the axle, on which the shoes act, permitting a quick stop with remarkable smoothness. Satisfactory trials were made last year with a car on the Ghent-Ferneuzen Railway Company's lines, and the Minister of Railways authorized the placing of friction pulleys on ten 15-ton cars provided with Westinghouse brakes, to serve as the final test. This took place at Setzalte, in the presence of engineers representing the principal railway companies of France, Germany, the Netherlands, and Spain. The result was favorable at all rates of speed. With the tire brake now in use, a train running at a speed of 81 kilometers (50.3 miles) per hour may be stopped within 290 meters (990 feet) in twenty-five seconds, while the Luyers brake can stop a train at the same speed in a distance of only 171 meters (438 feet) under the same conditions of adhesion and pressure, and in less than sixteen seconds.

[With regard to the smoothness of the stop referred to, that may be secured by hanging the brake from the body of the car, or from an extension equalizer, the practice of hanging the brake beam from the truck frame is the cause of the unpleasant jerk experienced on many railroads in this country when the brake is tightly applied until the stop is actually made.—Eds. Railroad Digest.)

Mekarski Compressed Air

Revue Generales des Chemines de fer, January, 1901, p. 65.

This system has been in operation since 1894 on the line from St. Augustin to the Cours de Vincennes. As at present constructed, the compressed air is necessarily inclosed in tanks placed beneath the car, having a capacity necessary for making the desired length of run.

This air before entering the cylinders of the motor, passes into another tank containing hot water, through which it bubbles, and by which it is heated and saturated. It is then allowed to expand in a special apparatus down to the pressure at which it is desired to work it in the cylinder, a pressure which can be varied by the motorman, but which is never allowed to exceed from 213 to 280 lbs. per square inch. The storage tanks are charged either at the termini, or en route, when the exigencies of the case demand it, by means of charging stations connected by piping with the compressing engines and wherein the required pressure is constantly maintained.

Prevention of Railway Accidents in England

Railway and Engineering Review, June 1, 1901, p. 343.

The English Board of Trade has issued a set of rules to be observed and put in force within periods of time which range from five years to an immediate enforcement. Thirteen rules have been drafted and nothing is said about automatic couplings, excepting the inference derived from a prohibition of the movement of cars by poling or tow-roping after twelve months' time from passage of the publication of rules. Five years are allowed for fitting brake levers on both sides of cars; three years are allowed for providing protection from injury through the breaking of gage glasses and for providing water gages. Within two years all engines and tenders must be fitted with sufficient power brakes in addition to hand brakes; switch-rods and signal wires must be sufficiently covered or guarded; ground levers working switches must be so placed that men when working them are clear of adjacent lines; and tool boxes used for the purpose of storing tools, etc., necessary in the working of locomotives must be placed so that the contents may be obtained by the man, while the engine is in motion, without risk of injury. No car constructed or reconstructed after twelve months from the date of the rules is to be employed on a railway without brake levers; six months' time is allowed for conspicuously marking the fouling points of sidings, while no time of grace is allowed for providing watchmen, or the fitting of brakes upon baggage cars where trains not fitted with continuous brakes, are working upon running lines beyond the limits of stations, or for full and sufficient lighting of freight yards and sidings.

To Prevent Smoke

The Common Carrier (Atlanta, Ga.), June, 1901, p. 144.

The Big Four is equipping its passenger engines with the Huff automatic blower. This improvement is so arranged that when the throttle is shut off the blower immediately begins operations and prevents black smoke from trailing over the train when engines are shut off. The blower is considered a great improvement over the hand blower so generally in use, and prevents to a great extent much of the uncleanliness usually met with in railway travel, owing to smoke and cinders.

A New Corliss Engine

Iron Trade Review. May 23, 1901, p. 19.

The loss by fire of patterns belonging to the Lane & Bodley Co., of Cincinnati, Ohio, made it necessary to complete a new set. This company, therefore, took the opportunity to design a new engine. It is of pleasing outline, ribs and sharp corners having been omitted. All oil drips from guides, cross-head, main bearing, crank-pin and eccentrics are collected and drawn into a cast-iron drip pan, from which the oil may be drained and filtered if desired. In the valve gear a striking innovation has been made. The familiar, central disc-rocker, with its four arms, is absent. The steam and exhaust valves are each operated by a separate eccentric, the rods from which are connected each to a separate rocker-arm, and from these two parallel rods are attached directly to the steam and exhaust bell cranks. These rods are all light and travel only 3 1-2 inches. The dash pots are of the vacuum type, consisting of single cylinder and plunger. The rod is attached to the latter by a ball joint, and the dash pots are off the ground, unlike the former type, and are close up under the steam bonnets, which enables their rods to be made short and light and places the dash pots in a convenient position for inspection and adjustment, and also removes them more effectually from dust and dirt. Lubrication of the plunger is effected by applying oil to the plunger in a groove at the top of the cylinder. Here the tendency of the vacuum is to draw the oil into the cylinder instead of blowing it out, as was the case with the old type. The governor is of the Hartnell type, running at 200 revolutions per minute, making the engine very sensitive to variations of load.

Pyrotechnic Fire Alarm

Insurance Engineering, May, 1901, p. 169.

A new electric fire alarm says "The Vindicator" is intended to announce the appearance of fire to passersby outside the building on which it is placed. It consists of a metallic case containing a charge of a pyrotechnic compound similar to Bengal light, and surrounded by a small igniting charge in which is buried an electric fuse. The whole is made water-tight and is arranged to be put in position on a cornice or other prominent part of the building. The fuse is connected through thermostats with a battery, so that a high temperature in the vicinity of one of the thermostats closes the circuit, explodes the igniting charge and lights the slow burning compound, which gives a brilliant light and thus attracts the attention of people in the neighborhood.

[Such a device if put on a station building or other valuable structure could also be made to illuminate a transparent sign or notice indicating the meaning of the display and directing an onlooker to the nearest fire alarm box, but why not connect direct with the fire hall, and have the device ring there, as well as alarming the neighborhood?—Eds. Railroad Digest.]

BOOKS REVIEWED.

Dictionary of Railway Words and Phrases

By G. A. Sekon, Editor of the "Railway Magazine" and the "Railway Year Book." London, The Railway Publishing Co. (Ltd.), Fleet Street, E. C.

This little book of 61 pages contains over three hundred words and phrases, each one of which is accurately defined. The writer of the book, who is also the author of "A History of the G. W. R." and "The Evolution of the Steam Locomotive," says in the preface "This brochure has been compiled in the hope that railway officers, no less than "*railwayaes*," will find it of not inconsiderable use. "Bunker First," is a term used to denote that a tank engine is traveling with the rear end foremost. "Clearing house" (London), the building is situate in Seymour street, adjoining the Euston terminus. In it is conducted the settlement of the accounts between the various railways arising from the issue of tickets from places on one railway to places on another, and from the conveyance of goods, etc., from one system to another. The periodical meetings of the various officers of the railways are also held in the Clearing House. A great deal of other work in connection with the railway system is also transacted. "Sick Wagon," is an expression used on some railways (particularly on Indian lines), to indicate the wagon needs repairs. These are a few examples of what the book contains. It is sold for one shilling, and is no doubt very useful in Great Britain. It is interesting on this side of the Atlantic.

Cram's American Railway System Atlas

We have received a copy of Cram's Standard American Railway System Atlas for 1901. This work is published by Mr. George F. Cram, of Chicago and New York. On the cover, printed in silver is an index of the various maps of the United States, Canada and Mexico. The maps of foreign countries, which this atlas also contains, are compiled from the Royal Geographical Society's charts, and are therefore correct. The atlas shows an exhaustive and painstaking arrangement of detail. Accompanying each map is a marginal reference index of other maps. The work contains a complete index of the United States showing the location of all the railroads, towns, villages and postoffices. It also gives the population of every inhabited place in the country, the number of banks in each place and the telegraph and express companies doing business over each railroad. The publishers state that the maps of the United States are drawn to the largest scale, and are of the clearest print of any published. The atlas is most useful to railroad men and others who are concerned in the geography of their own and foreign countries. It is a mine of information and a most useful reference work either for office or home library.

The Open Door to Success

By Jesse L. Hopkins, of the firm of J. L. Hopkins & Co., Importers and Drug Millers, 100 William St., New York.

This little book, which measures 2¼ by 3 inches, contains, as the author tells us "a few observations noted down for the benefit of my son." It is only commonplace to say that it has a good deal of practical common sense compressed into its little pages. We are told, among other things, that there are too many plodders—young men who do what they have to do faithfully and well, but who are really unprogressive, they are simply automatons. Faithfulness, Mr. Hopkins thinks should only be a foundation, and he urges the young man of today to "be more than faithful." The idea he endeavors to bring home to young men, is the necessity of studying the next position above, not with the unworthy motive of ousting its occupant, but with a view of increasing one's capacity. He thinks young men should show that they can do more than was exactly bargained for, in order to get on. The author holds that in business hours nothing should be thought of or done, but the business in hand, and that out of office hours wholesome invigorating recreation should be taken in moderation He does not believe in the young man becoming a recluse, or "going into society" every evening in such a way as to handicap him next day in the work he has to do.

Mr. Hopkins gives some good advice about excess. He does not preach or moralize. He points out that health is a most important business asset, and he also regards honesty as one thing most requisite. He summarizes business virtues by taking three (which, by the way, are on the coat of arms of the Canadian city of Toronto)—Industry, Integrity and Intelligence, and he recommends all young men to cultivate them. The book is not only readable, but it is most suggestive and useful. It is written with an easy diction, which leaves the mind free to imbibe the ideas and the truths which it presents.

Baldwin Record of Recent Construction

Catalogue No. 24, May, 1901, contains a fine half-tone showing a compound consolidation, with wide firebox, on the Lehigh, coupled to a train of steel cars, the train weighing 1,000 tons and just about to begin the ascent of a grade 60 feet to the mile. The further record of construction contains half-tone and dimensions of a compound ten-wheel engine for the B. & O. R. R., a compound ten-wheel engine for the Lehigh Valley Railroad, a compound Mogul for the A., T. & S. F. Railway; also a simple Mogul for the same road. A compound consolidation for the Rio Grande Western, a compound consolidation for the Colorado Midland, a compound Prairie for the C., B. & Q. Next follows a simple six-coupled double-ender locomotive, or "Mogul-Forney," 2-6-4, for the government railways of New Zealand; then comes a simple ten-wheel engine for the New Zealand Government, and then appears a compound six-coupled double-ender for the government railways of West Australia of the 4-6-2 type, which the Railroad Digest called the "St. Paul" type, in a recent article on Locomotive Classification and Nomenclature, which appeared in the April number. The record of construction concludes with an eight-coupled (0-8-0) simple tank engine for Spain, a six-coupled double-ender tank (2-6-2) for Natal, a Mogul for Zululand, and a Mogul tank engine for Egypt.

Pressed Steel Car Co. Catalogue

We have received from the Pressed Steel Car Company, of Pittsburg, Pa., a copy of its catalogue for this year. The company says in its introductory notice, that while it believes its own designs are the best and while it heartily recommends them, yet it has facilities for manufacturing in accordance with any other design, in pressed or structural steel, and will be happy to submit tenders on any such work. The catalogue is illustrated by a number of full page half-tones, showing the various styles of cars made, with general information and dimensions in each case. It is stated that the Pittsburg, Bessemer & Lake Erie Railroad is one of the many American railroads which has adopted the pressed steel car. From the moment it put into operation these cars, of 100,000 lbs. capacity it showed 73½ per cent. paying load to train weight, and showed train-mile earnings of $5.38 per mile.

Two matters which appeal very forcibly to the motive-power man with regard to these cars are maintenance, and their behaviour in wrecks. Under the former head some information is given with regard to corrosion. The American Engineer and Railroad Journal is quoted as saying that these cars, if not used for storage of soft coal, and painted often enough should be practically indestructible. The Pressed Steel Car Co. says corrosion is practically eliminated by painting every third year at a nominal cost of $8.00 per car. The behaviour of these cars in wrecks is shown by a photo of a derailment, in which engine and cars assume positions at all angles to the track, while the cars themselves were hardly injured. In another they remained intact, while the end of the train, being composed of wooden box cars, were derailed and badly broken up. One photo shows a very severe butting collision in which, while cabs and tenders were crushed together, and the engines lay smokebox to smokebox, a long line of highside steel hopper train as a whole had sustained the shock, but the wreckage appeared in certain sections only.

THE BRILL SEMI-CONVERTIBLE CAR.

A New Type of Car for Steam Roads

To most steam railroad men the terms "convertible" and "semi-convertible," as applied to passenger cars need some explanation.

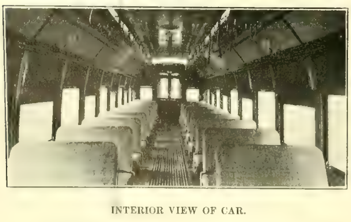
They originated with the street railway men, and grew out of the use of open cars with side entrances for summer and closed cars of ordinary types for winter. At an early period in the history of street car building an attempt was made to procure a car which in summer weather could be thrown open and at other seasons completely closed. This type of car gave rise to the name convertible.

The semi-convertible car was of an entirely different type; the theory being that it could be made sufficiently open to be agreeable in the warm weather by the removal of the sash and blinds, leaving, however, a solid framed side somewhat lower than that employed in standard closed cars. This type of car had no side entrance, but it gave the passenger all the advantages of the open car and was much stronger, more durable and safer than the open car pure and simple. This type has been in use for years and has been during this time steadily growing in favor.

The car here illustrated belongs to the semi-convertible type, but in its construction is radically different from anything that has heretofore been produced. It is the invention of Mr. John A. Brill, of the J. G. Brill Company, and is being adopted by many high speed trolley roads as being a satisfactory solution of a question which has troubled both steam and street railway men—that of giving a pleasant open car for summer use and at the same time providing a satisfactory closed car. It is especially designed as a safe and pleasant car for suburban traffic.

It has a somewhat lighter side than the standard car, but by reason of the method employed in framing and the construction of the roof, it is at least as strong as, if not stronger than, the standard type. The leading features are a side considerably lower than usual, which can be made either straight or curved, as may be desired, but in this case the steam car truss plank bolted to both posts and sills is employed.

The posts themselves are double, glued together, enclosing a tie-rod between them. The sash are double, of much larger size than those ordinarily employed, and so arranged that when it is desirable to open the car the sash slide upward on trunnions into pockets, framed in the roof, and are entirely out of sight and out of the way. The roof does not appear, from either outside or inside, to vary materially from the ordinary standard forms, as will be seen from the interior and exterior views. Sufficient space between the lining and roof boards, however, is found to accommodate both sash. At the same time the lower carlins and heads of the posts, the rail and the letter board are so combined as to form a roof having very much greater strength than is possible with any of the ordinary forms.



INTERIOR VIEW OF CAR.

The arrangement for sliding the sash out of sight into the roof is a very valuable feature. It does away entirely with the expense of taking out the sash and storing them and also obviates the probable breakage in handling. The new construction is so easily operated that the changing from open to closed is but a matter of minutes, and involves no cost whatever. In the case of a sudden storm the conductor can close his car completely within five minutes, and so give his passengers protection from the weather.

A great many of these cars have been built for electric railways, and they are especially worth the attention of steam railway men, not only on account of their convenience, great facility for loading and unloading at stations and the ample window openings, but because they present a means for high speed on steam roads where frequent stops have to be made. Their light weight reduces the inertia to be overcome in starting, and hence the acceleration is within the reach of lighter engines.

In spite of the fact that this increase of inertia has been one of the hindrances in the way of suburban traffic, very few railway managers have given it consideration, and cars have steadily increased in weight without a proportional increase in strength.

Graphite Grease For Signal Systems

A report to the engineer of maintenance of way by the supervisor of signals, on a leading trunk line, showing the satisfactory results obtained with a waterproof graphite grease manufactured by the Joseph Dixon Crucible Company, says: "At one point, from Oct. 1 to Nov. 28, one-quarter of a pound of graphite grease was used on locks, cranks and compensations on outside, and on machine in tower. The cost of putting it on was found to be very little more than oil. The same test was made at another point on the road with the same good results. The supervisor found the waterproof graphite grease to be better than any other kind of lubricant, as it can be applied quickly and stays where it is put. It is also clean, and the water has no effect upon it. Therefore the supervisor strongly recommends the use of this grease for all the places named above.

Railroad Day at the Pan-American

The Secretary of the Central Railway Club has issued the following announcement:

Friday, September 13th, 1901, has been designated by Director General Buchanan as "Railroad Day" at the Pan-American Exposition, Buffalo. The arrangements for the occasion having been entrusted to the Central Railway Club, President West has appointed the following committee to conduct the same: James Macbeth, M. C. B., N. Y. C. & H. R. R., Buffalo, chairman; W. H. Marshall, S. M. P., L. S. & M. S. R. R., Cleveland; S. H. Jones, G. M., Magnus Metal Co., O. P. Letchworth, Pratt & Letchworth Co., and Pemberton Smith, N. Y. Car Wheel Works, Buffalo. These gentlemen will seek the co-operation of committees from other railroad organizations in Buffalo and form a joint committee.

As the date named is the same as that of the next regular meeting of the club, it is proposed to hold the club meeting in the morning at the Hotel Iroquois, instead of 2 p. m., reserving for the afternoon a brief programme of exercises in the Transportation Building at the Exposition grounds. Assurances have been received from the Exposition management that it will do its part in making the occasion an entire success. It is desired to make the attendance sufficiently large to establish a record in the history of the Exposition.

The Utility of the "Convertible" Box Car

A Manning convertible box car, such as was described on page 149 of our April number, recently demonstrated its utility as a grain car at B. & O. elevator "C," Locust Point, Md. It arrived from Fairport, Ohio, with 1,500 bushels of corn. The hopper bottoms of the car were thrown open, as in a coal car, and the grain by its own gravity passed into the elevator hopper, requiring no manual labor, the usual steam shovel being uncalled for. This is the second load of grain delivered by this car at Locust Point. Its maiden trip was made in April, with a load of coal from Fairmont to Baltimore. After unloading by dumping, which took twenty seconds, it was converted into a flat bottom box car and sent to Chicago with a load of bucket oysters on B. & O. passenger train No. 7, by the United Express Company. After the satisfactory delivery of the oysters, the car was placed on exhibition at the Grand Central Depot and visited by many railroad men of the West.

It then shipped a load of grain for Baltimore as a flat bottom box car and unloaded there by the ordinary method—steam shovels; thus showing its qualifications as a coal and plain box car. On this trip it carried coal to the lakes and returned after dumping it, loaded with grain, as a coal car, and dumped it through the hoppers in exactly the same manner. It will thus be seen that the car combines the requirements for the accommodation of several kinds of traffic and need never run empty if loading is available. The use of such cars cut down one of the greatest sources of expense, which, with no return, the railroads are obliged to incur, saves a vast amount of money in wear and tear on the road and equipment, and reduces the amount of capital invested to a large extent.

Illinois Central Pension Plan

President Stuyvesant Fish of the Illinois Central Railroad has issued a circular announcing a pension plan for the 40,000 employes of the company. The plan, which is to take effect July 1, is said to be more liberal in its provisions than has heretofore been adopted by any other road.

The company makes a gift of $250,000, and in addition will each year make an approprition of an amount not to exceed $100,000. For each year of service an allowance of 1 per cent. of the average regular monthly pay received for the ten years preceding retirement will be granted.

An entirely new departure is made in a provision that leave of absence, suspension, dismissal followed by reinstatement within one year, or temporary lay-off on account of reduction of force, when unattended by other employment, is not to be considered as a break in the continuity of service.

The system applies to every officer and employe of the road, from the President down to the humblest laborer, except members of the law and surgical departments. All officers and employes who have attained the age of seventy years shall be retired, and such of them as have been ten years in the service of the road shall be pensioned.

There are other provisions, but these cited are the most important. It is also provided that no person inexperienced in railway work over thirty-five years of age and no experienced person over forty-five years of age shall hereafter be taken into the company's service.

Insurance on Southern Ry. of France

Like the other railroads of France, the Southern has turned its attention to the welfare of its employes, ever since its foundation. A home for infirm and aged employes was established in 1856. The conditions of admission are that the applicant must be at least 55 years of age and must have been in the employ of the company for at least 25 years. A small percentage of the employes' wages is retained, to which the company adds a sufficient amount to insure the pension. In case of the death of the employe before acquiring the right to the pension, the widow has a claim on the interest of the fund only. The amount of the pension varies with the wages paid.

The Car Foremen's Association of Chicago

The regular monthly meeting of the Car Foremen's Association of Chicago was held in Room 209, Masonic Temple, Wednesday evening, June 12.

Subject I. In case a new Janney coupler complete is applied to a foreign car account Janney head broken, knuckle and pin lost, what is the proper charge against owners?

It was decided that Arbitration Case 565 covered this.

Subject II. In making bills for repairs to foreign cars, should malleable iron brake heads for metal beams be considered under the heading of manufactured articles, or should they be charged at the regular price of 3c. per lb. for malleable iron, as per M. C. B. rules?

It was decided that the charge allowed for malleable iron should govern.

When billing for destroyed bodies of twin hopper bottom gondola cars, should bill be governed by the prices set forth in Section 25 of M. C. B. Rule 5, or can body be considered as that of a car designed for special purposes and bill rendered at present cost price per Section 27 of M. C. B. Rule 5?

It was the opinion that they should be considered in the former class.

Mr. J. C. Grieb presented a paper on passing cars at interchange points with defects for which defect cards are subsequently asked, which will be discussed at the next meeting.

The American Trolley in London

There can be no doubt that the company which enjoys the distinction of introducing the electric tram to the metropolis, with its installation in the southwestern district, has bounded at once into popular favor. What its financial history will prove remains to be seen; but the facilities it affords for cheap, comfortable and easy transport have been enthusiastically welcomed by the multitude. The scene at Shepherd's Bush on Sunday afternoons is a very remarkable one. The obtaining of a seat on a car bound, say, for Kew, is a matter of physical strength and vigorous elbow work, or of an anticipatory walk of a few hundred yards to a point where the incoming vehicle can be boarded. It is not impossible that the next generation will see London adequately provided with electric trams, but at present the rate of progress stops a little short of the sensational.—*London Financial Times.*

British Locomotive Builders Wake Up

A recent dispatch from Simla, India, says British builders have secured the latest contract for thirty locomotives for the Burmah railways, their tenders regarding price and time of delivery being more favorable than those of the American builders.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

M. C. & L. P. A. Portrait Gallery.

DAVID L. PAULUS.

Herewith we take pleasure in presenting to our readers the portrait of the successor of Mr. Frank Taylor at the Barney & Smith Car Co.'s shops at Dayton, Ohio, and in introducing him to our members, if any introduction is necessary.

Mr. Paulus was born in Philadelphia in 1862 and attended the public schools of that city. His first experience in painting was with his grandfather, Mr. D. R. Etter, a well-known painter, who had the contract for painting the rolling stock of three street car lines in that city. After serving four years with him, he went to Wilmington, Del., with the Jackson & Sharp Co., for about one year. He then contracted for the lettering and headlining ornamenting with the J. G. Brill Co., car builders, at Philadelphia, from 1879 until 1886, when he took the position of general foreman painter with the Lamokin Car Co., at Chester, Pa., retaining the same until they were forced out of business by the panic of 1895-96. He then went with the B. & O. R. R. as foreman at the Mt. Clare shops on the staff of Mr. J. D. Wright, general foreman painter of that system, but resigned at the end of fourteen months on account of ill health. After recuperating a while he accepted a position with the D., L. & W. R. R. on the staff of Mr. B. E. Miller, master painter, first, for about one year, as foreman of the road painting, and then in charge of the main car shops at Scranton, Pa., for about one year, where things were so congenial that he was reluctant to leave. However, being offered the position of foreman painter at the Barney & Smith Co.'s shops, he accepted the same April 1st and entered upon his duties, feeling that he has one of the best shops in the country with work second to none; and is determined to keep the painting up to its high standard.

Mr. Paulus joined our Association at the Washington, D. C., convention in 1891 and has since attended whenever it was possible to do so; he hopes to be with us at Buffalo in September next.

DAVID L. PAULUS

Dirt in Revarnishing Railway Coaches

Editor Railroad Paint Shop:

Some time ago you very kindly gave answers to questions on causes of dirt in revarnishing railway coaches. The answers were good, but to my mind there is another very important factor in causing dirt, which was overlooked by you at that time, viz., pumice-stone, or silica. I have become so confident that this is the greatest cause that both pumice-stone and silica were discarded seven or eight years ago. Since then I have had comparatively no trouble with dirt in the varnish. As a rule the revarnished work goes out as clean as work newly painted. Generally when a coach is shopped it is in a fairly dry condition; broken joints, cracks, or loose battens are wide open. Now watch the scouring process. The scrub brush is dipped in the washing compound and then into the pumice-stone; and, as the corners and crevices are the hardest places to clean, they get the first dose. Then follows the scrubbing of panels, or flat surfaces. Next it is all washed off—is it? "Aye! there's the rub."

Those open places have been well loaded with pumice-stone and washing compound, and have closed up, like a clam, and no amount of washing can take that out; for it is temporarily sealed up. The coach is given a short time to dry out (the more the worse under the circumstances), when the crevices again open. Now for your varnishes; you are sure the work is well dusted; but the washing compound holds the pumice-stone in the joints till the varnish brush gets in its work. Then, behold! You have—well, not quite a No. 2 1-2 sand paper finish. Then the question is asked, Who is to blame? I point my finger straight at the foreman and say, "Thou art the man."

J. L. JOHNSON,
Salida, Colo.

P. S.—Regarding the washing compound, I suppose it varies as much as the number of men who make it, so I thought it best not to advise on that line; each man no doubt thinks he has the best.

I will esteem it a great favor if you will tell me the best plan to remove old paint from a tank. J. L. J.

Removing old Paint from Locomotive Tanks

A Reply to Mr. Johnson.

This is a question over which honest men at our conventions have wrangled about as much as some other presumably honest men have disputed concerning heaven and hell at synods and conferences—in seeming ignorance of the fact that they might get into the latter place at an early date by such heated disputations and find out all about it for themselves! This reminds us that one way—an antique, barbaric way, of removing paint from a locomotive tank, by blowing live steam into it—is related in nature to this Tartarian exhibit; but it has this advantage over the old theology formerly taught us: "the smoke of torment" does not "ascend up forever and ever;" it is of comparatively short duration.

To my mind, the best way to do this disagreeable work lies between the sandblast and the mortar process. Having never tried the former I am not personally able to give an opinion of it; but others have, and it has its earnest advocates. Doubtless if one is fitted up with the most approved apparatus for the purpose and has an open shed, or suitable place, removed from the paint shop to do it in, this is a good, if not the best way to do this kind of work. It has this to recommend it; it cleans all the rust and scale from the iron and presents a bright, clean surface for the paint, which can immediately follow the operation. The mortar process we used for several years when we did locomotive tanks, and we found it a cheap and effectual process, though somewhat dauby and nasty, unless the mortar is spread on thickly at night and left until morning in a shop of the right temperature so it will not dry on, when it may be scraped off, paint and all, with a scraping knife and swept up and put in a barrel, on account of becoming sufficient-

ly dry. Then the tank can be scrubbed and washed with water and left to dry ready for the paint to follow. Some men put on the mortar and remove paint the same day, but it is a salvey, sticky mess. In this case, wash off with water from a hose as before. The mortar in either case should be spread on thickly enough so that the trowel will float over the rivets. To make the mortar, pour out about a half barrel of unslacked lime into a suitable slacking bed, or trough, and proceed to slack it by pouring on hot water, which water has been previously made a strong lye by dissolving about as much caustic soda as it will take up. When the lime is well slacked with this, and sufficient clear water to reduce it to a stiff mortar to stay in an upright position on tank, it is ready for use. Or, the requisite amount of caustic soda in the lump may be added to the lime and all slacked together. I used to guess at the amount of soda—never formulated any rule—perhaps five to eight pounds to the half barrel of lime. But tanks are larger now and a bigger dose of mortar may have to be made. By taking a laborer for this work I have removed the paint from a 15 to 20 foot tank for about $3.50, including the price of the soda and lime. I have tried all ways that I know of, except the sand blast, and prefer the mortar process when properly administered. This mortar, applied while hot, is more effective than any paint remover on the market and far cheaper; and the after-effects in painting are taken care of with a good scrubbing and washing with water before painting and allowing the tank to become perfectly dry around rivets and in seams. For anything made of iron or steel, or other metal, this is all right. Indeed, I have removed the paint from a car panel in this way and painted and varnished it and exposed it to the weather and saw no evil effects; but if a whole car was done this way it might get under the battens or into cracks where it could not be removed, to afterward come out and cause no end of trouble. And this would doubtless be the case with all paint removers on the market. I would as soon have the home-made mortar as any of them.

Compressed air and gas is the best paint remover for wood; and the same is true for thin iron, but with the thick iron or steel of locomotive tanks it takes too long to heat sufficiently to blister the paint and varnish properly for scraping off, to make this an effectual and economical means of doing the work.

Appearance Vs. Durability

Editor Railroad Paint Shop:

In the general rush of work the tendency of workmen to increase the durability of work has more than one drawback. It destroys the clearness of coatings that the average workman delights to see on all of his work. Oil being the greatest life giver to any pigment, necessarily tends to dim the brightness and bloom of both varnish and color. Color mixed with oil, while it adds more life-giving properties, will not show as full and as clear as when it is mixed with japan, gold size or varnish, however much it may add to the life of the surface of the paint. The sacrifice is in the clearness of color for durability.

The same thing holds good in the manipulation of varnish coatings. One elastic coat upon another will show a dimness of cast on the finish that will be right the reverse on quicker and harder drying coats. It is often the case that cheap varnishes show to better advantage right at the start, but invariably prove to be worthless as compared with higher class goods in actual service. While oil is the life-blood of paint, it is also the stamina of varnish; and where other mediums are entered to displace it in the proper mixture of gums, the less durability we have in the varnish, although it may show a brighter and greater gloss, which is so misleading to the common run of varnish intelligence that it is becoming a question of vital importance to the painter's reputation. It is often brought against the painter's work when he is altogether not to blame in the matter; for he is always on the alert to give the most durable job possible, in the limited time that he has to do his work; and, of course, he is forever figuring just how much life-giving properties he can give his coatings, and just how much driers, and quick coating, or life-destroyers, as we can rightly name them, he can get along without.

This shows just what intricate measures the painter has to deal with in making his mixtures. While he wants to make his work show up and look well at all times, he is forever "up against it," as it were, in regard to a more vital point—the durability of his work, which is responsible for his reputation (more or less) as a master at the business.

A study of the nature of paints and their mixtures in the line of mediums used, soon proves that the stability of oils far exceeds any other mediums that could be utilized as a liquid to mix with dry pigment; and, on the other hand, the driers which are always made from earth pigments, which are natural driers, along with those produced from bi-oxides and bi-carbonates, always have a direct tendency to lessen the elasticity of the oil used, and should be used with this idea in view. Although the modern way of coach, car and carriage painting cannot be carried out without the aid of driers, yet there is a limit beyond which their use is a direct detriment to the possible durability of this work. By hurrying work with driers, aid is given the destroying agency of the elements. This cannot be doubted by any intelligent, fair-minded painter.

Then what can be done to meet the demands of the trade in this forever increase in speed?

This question is an open one, and must be answered individually by every one in his special work. The day is already here when the painting trades have shown that they have advanced as fast as any other known vocation, and that the practical men should show the whys and wherefores of the natural tendency of rushing things to death. There is a limit to all things swift and fast; painting is no exception; and surely the quickly-rushed-out work will be in the soonest at the death. This is no dream.

The heading of this subject is the point at issue, and is one of the things that overcomes the usual plea for better and more durable work. The average superior officer is satisfied if the work shows a fine, glossy finish when it leaves the works; and surely every one should be pleased as far as the looks are concerned; but no one knows the true state of the case better than the practical man. He alone is thinking of the possible results of eight, ten or twelve months exposure to the elements, and more than once has he wished that he could have had more time on the job. He might like to have a Scripture saying applied to him, "he hath done what he could."

If the work looks well, so much to his credit. If he has pushed it through on time—that is, the limitless time of "Get it out as quickly as possible, only so you get it out," why he has pleased his employers. So much, so good. But, lo! if the job shows up badly after it is in service a while, he has to stand all responsibility, and no one to say him nay. Surely the poor painter's attitude is an uncomfortable one. He's either in it clear up to the neck or he is out of it altogether.

But to the point again. Must this thing keep on? Can't there be some power brought to bear upon the painter's universe that will place the painter in possession of his voice, and power to use it in claiming his rights; to come out and say that so and so must not, and will not be done? instead of the weak, puerile style of saying: "I will do anything to hold my job." If the paint shop is not the equal of any other department, then what is it? Possibly a kind of hang-on, tail-end kind of a have-to-be-painted sort of a section.

Well, I remember an actual fact that happened when as a boy I was serving my time. One day an old farmer came into the shop and wanted his buggy painted. After giving all the information necessary about so many coats of paint, striping and varnishing in first-class shape, he turned to go away, and said to the boss these startling words: "I'll be arter the job to-night after sundown," and closed the door!

Well, he got the job, but it was a good thing he came after it after the light had gone out.

There has been another feature in connection with this question that has forced its way forward very fast.

General managers, bosses and those in high authority have argued that if finishing varnish is better wearing than rubbing, why use the rubbing at all? Why not use all finishing? And thus we have this superior (so-called) knowledge to go up against.

While the above is all right in one way, it is all wrong in another. The ifs and whys are very meaningless words, or

they are extraordinarily broad in this case. If the painter has all the time he wants to do his work in, then the system of no rubbing will bring good and durable results. If he hasn't, then surely his work will show a very hazy gloss finish right at the beginning, and will look very flat shortly afterward, and lose its gloss altogether in a few months, and there will be trouble raised about the affected gloss, or the natural dying away afterward. I will admit that it will give more lasting results as to service, less the beauty of the mirror finish, which is the painter's and also the average public's delight. To obtain one, the other has to be sacrificed, unless, as was stated above, there is more time given on the work.

Some of our master builders see and coincide with the painter's judgment, but the masses are against this rule, and time is allowed to supersede and come between the painter and his legitimate work.

Rubbing varnish is necessarily a quick-drying varnish. Its purpose is to aid in making a surface, so that a flowing coat of weaning varnish will make an even, level, mirror-like finish. This is the office of both varnishes, pure and simple. Now, when this arrangement is displaced there can be only trouble to follow in more ways than we have time to enumerate in this article. There is this, however, if highly finished work is not wanted and the durability of the gloss is not needed, why the use of varnish at all? Paint with oil paint, which will give the service, possibly as well, as bringing up the job in the improved way. Economy in this respect however is not in keeping with the advanced ideas in painting. This may do for house work on the outside, and freight car painting; but is not adapted to the finish of our modern railway coaches or carriage and street car painting.

As was stated by one of our colleagues at Detroit, in answer to the question, "Why the need of discussing these questions?" We paint cars to please the public, and the general demand for taste and beauty, as well as durability, has brought car painting up to one of the leading sciences of the day. There is just as much thought in how, and what to do to meet this demand, as there is in any other branch of the business, to-wit, the wise painter, where he is so fortunate as to have something to say about his work, chooses between the two extremes and comes in on the happy medium basis, which is about all there is to do, minus the natural result that is possible when the work is properly done in the proper time. It is like buying gold dollars for ninety cents, to expect to get durable results by using quick-method processes. One is just as possible as the other. This is one of the branches of business, but the improvement has never been forthcoming in the paint department. The line of work by the painter is between the outer and inner rim of the wheel, that is, his work is to please his employer, and do it as economically as is possible, within reason; also to bear up his well-earned reputation by beautifying his work and making it as durable as possible.

Between these two edges lies the painter's sphere of usefulness. He may fall down on the one and rise on the other; yet in diplomacy he has no peer, and might be easily trained for a United States Minister to Turkey, or some other difficult job. For this is his position every day in the year, as against the difficult questions that are forever arising in his department; although he has to meet them in some way or other, and do his best to suit the demand for good work in any and all circumstances.

In making this plea to the mechanical world, we wish to stand on the ground of equal footing with any other mechanic and have given to us, the practical men of the paint department, as much liberty as is due in this regard, and no more. It seems to be the general thing to allow other branches to have the proper time, but when it comes to the paint department, then things have to be rushed through. But if such things are necessarily demanded there should be allowances made for quick work, and no one held, to any great extent, responsible for such work.

CHARLES KOONS,
Master Painter, St. Louis Car Works, St. Louis, Mo.

Annual Varnishing of Passenger Equipment

The word "annual" is used in the above heading, because that has become the customary way of treating passenger equipment for cleaning and varnishing; but is it necessary to varnish it as often as that? Is it wise? Is it economy? Well, the answers to these questions depend to some extent upon how it is treated during the year while in service. If it has had a hard run and made a great mileage, with only such superficial cleaning as could be given it with brush and water in warm weather, undoubtedly it will present such a sorry looking spectacle of accumulated smoke and grime at the end of the year as to require a thorough scrubbing with soap, pumice and water and the application of a coat or two of varnish in order to put it in presentable shape again. But if it has had an occasional cleaning during the year, with an up-to-date terminal cleaner that will preserve, rather than destroy, varnish, then it ought to run fifteen to eighteen months before requiring revarnishing.

If this position can be borne out by facts why, then, is not this the better way? It is, for two principal reasons; first, because it is an immense saving of labor and material in such frequent varnishing as annually; and, second, because it is so much better for the condition and life of the painted surface of the car to keep off as much as possible, consistent with its durability, the accumulation of varnish, which hastens the day of cracks and fissures and renders burning off and repainting necessary.

Horace Greeley said his duties as editor of the Tribune were not so much to see what should go into the paper as what should be kept out. It strikes us that the average master car-builder, or master car painter, might use his good offices with equal success for the railroad employing him, not only in keeping poor material off the cars, but in devising ways to use as little good material upon them as is consistent with their proper maintenance; for every painter of experience knows that equipment, as a rule, is painted and varnished to death—it is loaded beyond endurance; it is not only given too heavy a coating to produce a surface when new, but it is coated too often afterwards. He knows that the thinnest coating of material on the car, inside or outside, everything else being equal, will wear the longest, because it will not crack so quickly. There is a common error imbibed by the inexperienced that "the more of a good thing the better;" that the more good material put upon the surface of the wood the better it is preserved! No greater fallacy could be entertained. It will prove its own destruction. Put on enough and often enough to prevent its disintegration and perishing by the elements; that is all.

Now, then, how can an equipment be handled to be varnished once in eighteen months and produce these good results? It should be under the control of the Master Painter, as well as the terminal cleaning, who will keep records of it and follow it up by inspection and request its shopping when the proper times comes, instead of a hap-hazard method of doing it about once in so often, regardless of its condition. It should be done when it needs it and not when somebody, who has no practical knowledge of these matters, wants it done. If a car is simply dirty by smoke accumulation that is no reason why it should be varnished. Clean it! Remove the smoke with some detergent that does not injure the varnish, and let it go. This operation will save at least the price of the varnish, which is no inconsiderable sum, and, incidentally, avoid its rapid accumulation on the car. It seems reasonably clear that if railroad companies would only save what expense they put out in needless varnishing and put it out in some well-directed terminal cleaning that they would be just as well off financially at the outset and the equipment would be much better off, which would lead to improved conditions all round in the long run. This method would curtail the paint and varnish-making and using business, but railroads are built to make money for themselves and not to kill themselves by consuming materials not needed, for the purpose of helping out somebody else's business.

However, if it is thought best to varnish annually and not to indulge in the luxury (?) of terminal cleaning, then a light-bodied varnish should be used that is well adapted to the work—not

too heavily charged with gum, but with oil predominating—and not too much of it, nor too many coats put on. There will doubtless be cases on old work where one good coat will be enough, and on newly painted work three coats are not necessary, two being entirely sufficient for twelve months' run under almost any conditions.

Of course it is to be understood that alkali districts are excepted in these remarks,as also are other unusual conditions.

"The Modern Wood Finisher"

The above is the title of a treatise on that subject by Mr. F. Maire, from the press of "The Western Painter," 1901, published by Mr. Chas. H. Webb, Chicago, Ill, price 50 cts. Mr. Maire was formerly editor of "Painting and Decorating," and knows what he is writing about, being a practical painter and finisher. This is an up-to-date work; in fact, this might be inferred, knowing the source from which it has been produced. It is a practical treatise on wood finishing in all its branches, including tools and materials employed, preparation of surfaces, stains and staining, fillers and filling, shellacing, varnishes and varnishing, rubbing, polishing, French polishing, wax polishing, oil polishing, etc. Also a full description of the woods employed in wood finishing, their treatment, and the finishing of floors. It is well worthy of a careful perusal by every car painter.

The Sinking or Pitting of Varnish

Varnish sinks like anything else that is not sustained—unless in its own composition lie the elements of weakness by its being improperly compounded. A good varnish will maintain a fair lustre, if laid on a suitable foundation, but probably much varnish has been unfairly condemned for sinking, flatting, enameling or pitting when the mischief was in the surface it was applied to, especially if a high grade, slow drying finishing varnish with consequently sufficient time to penetrate and sink. Did any one ever hear of a cheap furniture varnish cutting up the capers incidental to a car varnish? It will shine like a diamond (while it lasts) and be almost dry before you get it laid on. The car varnisher looks with eyes full of envy upon the furniture varnished in such a case, while he sadly contemplates the flattened surface on which he has spent days of toil.

Well, cease your repining and "get a gait on," and go to work to avoid the trouble, if possible. Do not worry. Look on the bright side of life. Everything sinks without a prop. A locomotive cannot run on a marsh without the right "rough stuff" to run on. You will feel a sinking sensation in your stomach about 11 o'clock any day at hard work without good "filling" in it.

And possibly this may be just what's the matter with your varnish—the "filling," or rough stuff, may be too absorbent, having been mixed too flat with turpentine. You would sink in quicksands. Why blame a varnish for sinking in similar circumstances? A varnish pits sometimes "because it is sensitive," but not always. A finishing varnish that always pits on first coat on old work, or on flat color, and never pits on second coat, or on any solid non-absorbent foundation, should get a new trial before another jury before being condemned. On old, dead varnish that is absorbent it need not be thought strange if a good finishing varnish pits in warm, damp weather, when the drying facilities of the shop and weather are poor. In cases of this kind a coat of rubbing varnish will be safer, or, what is better, a coat of half rubbing and half finishing, mixed and well shaken together. This quickens the setting, so that the changes of air do not trouble it and cause it to pit; besides, it enables a second coat to be applied sooner and forwards the work with greater rapidity without any appreciable loss in durability. By this means the second coat is insured from sinking, because the first is dry and hard, which is not always the case where finishing is applied over finishing with not sufficient time between coats for drying, and a consequent flatting ensues.

The fact is, there is a cause for every effect; and a little painstaking and reflection, with coolness and candor, will be apt to locate it; and if it is wiht us we must remedy it. If with the varnish maker, so report.

NOTES AND COMMENTS.

According to daily press despatches, the wages of all shop men, car inspectors anr cleaners along the entire Lehigh Valley Railroad valley system, 3,600 in number, have been increased from 15 to 30 per cent, dating from May 12. The boiler makers who were employed in the local shops and who struck about a month ago, are still out. When they were paid off they, too, learned that their pay had been raised.

"A well-known zinc company writes us," says The Western Painter, "that at a meeting in Paris, presided over by M. Millerand, Minister of Commerce, a specially-appointed committee adopted a resolution to have the use of white lead prohibited by law in the manufacture of paint."

They should next appoint another special committee to adopt a resolution to have the use of wheat flour prohibited by law in the manufacture of bread. One is really about as indispensable as the other in a good article.

If St. Paul could awaken from his long slumber and see the great city named after him, and note the railroad stock rolling into it with his name painted thereon, he would conclude he had not lived in vain. On the other hand, all that we remember of seeing named after the Roman Emperor, Nero, who beheaded him, was a black dog; and the name was no honor to the dog. Draw your own conclusions.

According to the following editorial note from the Boston Herald of June 18, all of our folks should calculate on attending the convention this year at Buffalo and incidentally take in the show:

"The going-to-the-Pan-American-Exposition habit is growing on the people. Competent judges say the show is the biggest on earth this year, and worth many times the price of admission."

If any further inducement be needed to stimulate the members of the M. C. & L. P. Association to attend our next convention it is to be found in the fact that Director-General Buchanan has set apart Friday, September 13, as "Railroad Day" at the Pan-American Exposition. As our convention opens on September 10 we shall be on hand for this important and interesting event. The arrangements to be made for the occasion will be in the hands of a committee of the Central Railway Club, composed of Messrs. Jas. Macbeth, Master Car Builder, of the New York Central R. R., W. H. Marshall, Superintendent of Motive Power of the L. S. & M. S. R. R., and others acting in conjunction with the representatives of the various railroad organizations of Buffalo.

We clip the following from "The Western Painter" for May, regarding a member of the M. C. & L. P. A., who was foreman painter for the Louisville, Evansville & St. Louis Ry., Princeton, Ind., and inventor of the "X, Y, Z" system of painting engines and cars:

"George E. Bryant has resigned his position as manager of the X. Y. Z. Paint Co., Evansville, Ind., and will become manager of a Texas oil company."

The Michigan Central is proposing during the coming summer to illuminate Niagara Falls, which will afford a view of the greatest grandeur. A test recently made by officials of the passenger department with an electric searchlight convinced them that marvelous effects could be secured. Accordingly arrangements have been made for several similar searchlights to be erected on the high banks overlooking the falls from the Canadian side. The electric power is derived from the rapids, and the illumination will take place during the passage of all trains after nightfall. The most superb view will be from Falls View Station, where sufficient stops will always be made to allow the passengers to fully enjoy it.—Leonard's Railway News.

Lady (who has pestered artists with questions for hours)—All your marine pictures represent the sea as being calm. Why don't you paint a storm sometimes?

Artist—We painters in oil cannot paint a storm. I have often outlined a storm on the canvas, but as soon as I begin to spread on the oil colors the waves subside, and the sea becomes as calm as a duck pond.

Lady—Yes, I have read about the effect oil has in calming the waves, but I had no idea it was so effective as all that.—*Stray Stories.*

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

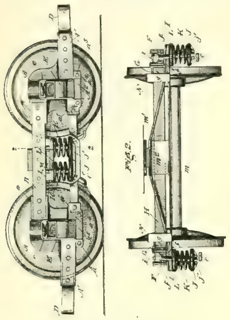
A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

Swing-Motion Truck

No. 674,225.

JOHN TAYLOR, of Troy, N. Y.

In a truck, the combination of the pedestals, a pair of parallel flat bars connected to the upper parts thereof, said bars being arranged vertically edgewise, and a single flat bar connected to the lower parts of the pedestals having its



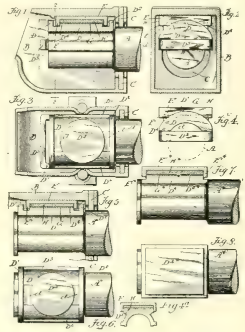
ends arranged vertically edgewise but twisted intermediate its ends so as to have its central portions flatwise; with castings secured between the upper bars of the side frames provided with vertical openings for the passage of spring hangers, hangs suspended from said castings, the spring seats on said hangers, the springs mounted on said seats, the cap plates on said hangers above the springs, and the bolster supported on the cap plates.

Railroad-Car Axle-Bearing

No. 673,502.

GEORGE W. MAGEE, of Brooklyn, N. Y.

The conditions under which the bearings of car-axles are required to work become exceedingly difficult as the load is increased. Freight cars are now constructed with a registered capacity of a hundred thousand pounds and are privileged to carry in emergencies 10 per cent. in excess. Even with the slowest freight trains there are always liable to be occasions, particularly in descending long grades, when a high speed is endured for a long period. The Pullman and the Wagner cars running regularly at high speeds weigh fifty tons without including load. Much of the difficulty is due to the shifting of the load toward one end or the other of the several bearings, this becoming particularly objec-



tionable when the load is carried near the inner or technically the "rear" end of the bearing, where the grit can never be completely excluded. Another difficulty is due to the load being borne on a narrow surface instead of on the whole of the proper bearing surface.

It is common to not extend the brasses down to the level of the axis, but to cover only a portion of the surface, and thus by limiting the bearing surface to a narrower area near the top of each journal to avoid the liabilities of the brass to spread.

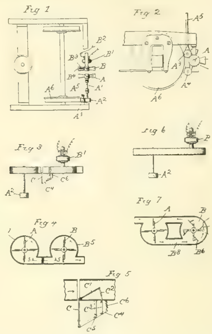
This bearing insures that the load shall always be uniformly distributed over the journal, provides against the liabilities of the brass to spread, and allows the brass to be extended down quite to the level of the center of the journal and still be free to make all the rocking and other motions ever occurring in practice due to malalignment.

Electric Lighting for Cars

No. 672,878.

JAMES W. GUILLOTT, of Chicago, Ill.

The invention consists in a device for generating electricity on moving trains comprising the driving parts of the car, a fan driven thereby, a generator on the car, a fan or motor to drive the generator, the two fans related so that the first drives the second, an auxiliary motor connected with said generator and adapted to drive the same when the car is stationary, said auxiliary motor connected with a source of power-supply, a wind-operated controlling device interposed between said auxiliary motor and the source of power supply, and associated with one of said fans so as to be operated when



the fan is in motion and disconnect the auxiliary motor from the source of power-supply, and to connect the auxiliary motor with the source of power-supply after the speed of the fan falls below a predetermined rate.

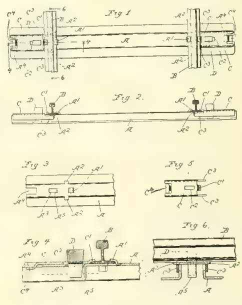
Railway-Tie

No. 671,606.

CYRUS OLDROYD, of Morrisdale Mines, Pa.

The novelty of the invention is set forth in the claims:

1. A railway-tie formed from sheet metal having a holding-lug to engage one side of the rail and opposite laterally-projecting lugs for engaging a holding-piece for the other side of the rail, all of said lugs integral with the sheet metal tie.



2. A railway-tie formed from sheet metal, having on its top a lug punched out of the metal and bent upwardly to engage the rail and opposite laerally-projecting lugs or parts punched out of the metal and bent upwardly so as to project from the sides of the tie.

3. A railway-tie formed from sheet metal, having on its top a lug punched out of the metal and bent upwardly to engage the rail and opposite laterally-

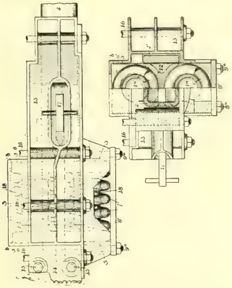
projecting lugs or parts punched out of the metal and bent upwardly so as to project from the sides of the tie, and a cut-away portion at each end to receive engaging parts on the holding-pieces for the rails, substantially as decribed.

Draft-Rigging

No. 673,419.

JACOB J. BYERS, of Cameron, Mo., assignor of one-half to the National Malleable Castings Company.

A draft rigging having in combination with the draw-bar, a yoke, the arms of which are connected to the sides of the draw-bar, springs arranged one above the other within the yoke, and followers also arranged between the arms of the yoke, said springs and followers being removable from below, independently of the draw-bar.



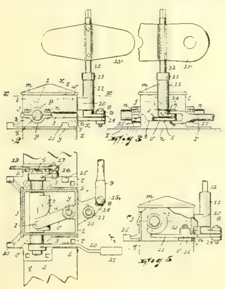
A draft rigging having a yoke, the arms of which are adapted to be connected to the sides of a draw-bar, springs arranged one above the other between the arms of the yoke, and followers adapted to fit against the ends of both springs, and also contained between the ends of the yoke, said springs and followers being removable from below independently of the draw-bar.

Switch-Stand

No. 669,816.

JOHN WRIGLEY, of Elmira, N. Y.

In a switch-operating mechanism, the combination of a casing comprising separable sections disposed the one above the other, a suitably-fulcrumed lever projecting into said casing, one of the walls of said casing having a slot for said lever, a slide covering said slot and movable with the lever, and means for operating said lever inclosed in said casing, the upper casing-section having a flange overlapping the joint between said sections, substantially as described.

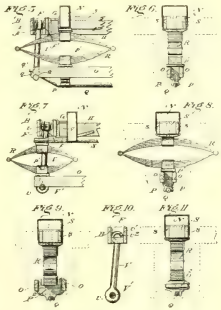


Truck

No. 674,224.

JOHN TAYLOR, of Troy, N. Y.

This invention is an improvement in what are known as "short wheel base swing motion double trucks," particularly adapted for electrical street railways, and especially designed to radiate on short curves and to be used under long open cars.



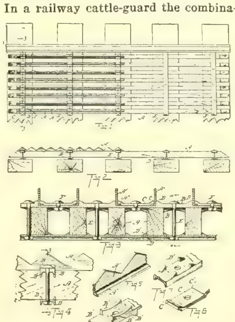
The invention consists in the novel construction of the truck frame and also in the means for suspending the bolster springs and spring plank on swinging supports for the truck frame, so as to permit swing motion or lateral movement of the bolster relative to the truck.

Railway Stock Guard

No. 673,112.

EUGENE COOK, of Kalamazoo, Mich.

In a railway cattle-guard the combination of longitudinal bars A of wood, crossbars B, D, clamping said wooden rails together the said bars being formed with suitable projection to engage and retain the wooden rails in position and the upper bar B being set in suitable gains in the wooden bars; metal bars A′ having horizontal flanges A″ at their bottom resting on cross-bars B and against shoulders B′ thereon; and clip-plates C conformed to engage the flanges A″ and retain the metal guard rails in position.

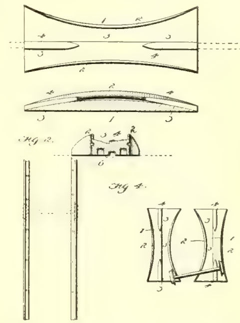


Car-Replacer

No. 673,883.

ALBERT J. MICHEL, of Scranton.

A car-replacer consisting of a shoe or casting having longitudinal lateral flanges and end slopes or inclines having thereon central ribs or guides terminating at the eminences of said slopes or inclines and having corresponding inclinations therewith, said shoe also having its upper surface, between said slopes or inclines, laterally or transversely inclined from one side toward the longitudinal center thereof.



Ancient American Sleeping Cars

L. Xavire Eyma, a Frenchman, who came to this country in 1847, wrote an article in "L'Illustration," of Paris, published July 22, 1848, giving his experiences on the railroads of the United States. He says that at that time the Baltimore & Ohio railroad had a length of seventy leagues, and that the cost of the road was 4,116,744 francs, the receipts 3,988,456 francs and expenses 1,964,741 francs. He also gives considerable space to the interior arrangements of the sleeping cars used at that time and says that "they are actually houses where nothing is lacking for the necessity of life and are divided into compartments and sleeping rooms, some for men and some for women." Each room held six beds, or rather little couches, in three tiers along the sides. He winds up his account by saying that valuables were not particularly well taken care of, as in America there "were no such things as sneak thieves."

Exhibits at M. M. and M. C. B. Conventions

The Adams & Westlake Company, of Chicago, had a temporary building fitted up to resemble the interior of a sleeping-car. This was lighted by acetylene gas, as employed in the Adlake system. Light was radiated from oval and circular globes set in the form of arches, in the roof of the car. The whole formed a tasteful and effective exhibit.

The American Car and Foundry Co. had an exhibit of several cars in the D. & H. Railroad yards including a wooden box car, with steel underframe of 90,000 lbs. capacity; an 80,000 lbs. steel gondola, which had been in service for three months on the Central Railroad of New Jersey; a steel gondola of 110,000 lbs., which had been used for nine months on the Pennsylvania R. R.; a steel gondola of 80,000 lbs. capacity, in service three months on the Northern Pacific; a steel coal car of similar capacity, with drop door, which had been running on the Chicago & Alton for four months, and a steel coal car of 110,000 lbs. capacity with the American Car & Foundry Company's draw-gear, which had been in use for four months on the Chicago and Eastern Illinois.

The American Steel Foundry Company, of St. Louis, Mo., exhibited models of steel trucks and body bolsters.

The Auto Coupler Company, of Cincinnati, Ohio, had an exhibit consisting of two small cars or trucks fitted with Auto couplers, and a bumping post with an American coupler. The peculiarity of the Auto coupler is that knuckle and head are pivoted on same pin. The Autos coupled, as they "ought to," with themselves and the American—as they will with any coupler of the M. C. B. type. The exhibit was designed to fully demonstrate the usefulness, simplicity and effectiveness of this style of coupler. When spoken to, the gentleman in charge said: "These Auto," and then proceeded to demonstrate that they actually did couple automatically with any M. C. B. type, and are as flexible as the old link and pin, while they comply with the letter as well as the spirit of the law.

The Bettendorf Axle Company, of Chicago, exhibited truck and body bolsters for 30 and 40 ton cars, and a structural steel underframe, a pressed steel centre sill and a structural steel car.

The J. G. Brill Company, of Philadelphia, had a full size car truck on exhibition.

The Buckeye Malleable Iron Company of Columbus, Ohio, exhibited the Major automatic coupler, and the Buckeye draw-gear attachment, to be used when the link slot and pin hole have been abandoned. The attachment enables cars to be coupled on very sharp curves, and is also useful when cars are being drawn off a car ferry, where, from tide being out or for other reasons, the deck of the boat and the landing stage make an acute angle. Such a device carried on a yard engine where loading and unloading ferry boats is part of the day's work, would no doubt be a very useful tool.

The Carborundum Company, of Niagara Falls, N. Y., had a full line of carborundum goods, such as carborundum wheels, carborundum paper, cloth, etc., etc. A specialty not usually found in the company's trade catalogue, but nevertheless much in demand, was a pin for ladies' hats made with sparkling irregular masses of carborundum, in the state in which it comes from the electric furnace.

The Chicago Pneumatic Tool Company had an extensive exhibit, in which reversible drills, Boyer drills, rotary drills, flue cutters, flue welders, and breast drills were shown. There was also the Boyer long stroke riveting hammer, and the Boyer chipping and caulking hammers. With regard to the latter machine, its excellence is now so well known that the company did not find it necessary to hammer its merits (physically as well as metaphorically) into the heads of the public, and though the tools riveted the attention of all who saw them, there was not much rattle or clatter made by the exhibitors. This is no doubt owing to the fact that the fame of pneumatic tools is the only thing that is making any noise now.

The Chicago Railway Equipment Company displayed National Hollow brake beams, also Kewanee, Diamond and Central brake beams, Automatic Frictionless side bearings, and a brake beam specially adapted for high speed brake service.

The Coe Manufacturing Co., of Providence, R. I., showed its Ribbon gold leaf and gilding wheels, which are now extensively used for this kind of work by all those who look for economy and rapidity of execution in laying on gold or aluminum leaf. Work can be done by aid of this tool in the most exposed and windy situations without fear of any loss of leaf.

Cliff & Guibert, of New York, gave daily exhibitions of the automatic fire hose and reel in operation. The hose is coupled to the hydrant all the time and is so wound on the reel that, when the nozzle is taken by the operator and carried off toward the fire, the hose rapidly unwinds, and when it is all out a stream of water flows through the hose without the loss of time which would be occasioned by the operator having to run back to the hydrant to turn on the water. The device is effective and prompt in action and these qualities mean something when fighting a fire.

The Consolidated Car Heating Company, of Albany, N. Y., showed steam heating apparatus and gave a practical exhibition by working with steam. Steam couplings, steam traps, etc., were on view, together with electrical heating apparatus.

The Consolidated Railway Electric Lighting and Equipment Company of New York showed in addition to the magnificent Sante Fe baggage and smoker, a refrigerator car on the D. & H. tracks, the refrigerating machinery of which was operated by belt from the axle, and by electricity from a storage battery if the car should be sidetracked with perishable load. A cool, and above all, a dry circulation of air is maintained in this car. Some years ago, the late Prof. Tyndall proved that the germs of putrefaction were to be met with in moist air even though a low temperature had been secured, and that these germs were not found to be present in thoroughly dry air even at a higher temperature. The company tested Professor Tyndall's statement, and found it to be correct, as everyone expected it would be. Meat which had been shipped in a car supplied with dry air at ordinary temperature, was found to be in perfect condition, though a little flabby when cut. The system of refrigeration adopted by this company has the double advantage of keeping the contents of the car in perfect condition by the circulation of dry air, and meat is kept firm, and in excellent condition for the butcher by reason of the cold air circulated. Dry and cool air does the work.

The Crane Company, of Chicago, placed before the public's admiring gaze its new locomotive muffler pop valve, gun metal globe and angle valves and blowoff cocks for high steam pressure.

Mr. S. A. Crone, of 102 Chambers street, New York, exhibited spiral nut locks, fibre dust and oil guards, models of a new rocker side bearing for cars, and the Miller Car Ventilator, a device which is easily applied, which permits the circulation of air, but which prevents the entrance of sunlight, dust or dirt, and which, open all the time to fresh air, excludes rain, and effectually bars the "busy burglar," and in a word "puts him out of business."

The Day-Kincaid Stoker Company's exhibit of a mechanical stoker for locomotives was the cynosure of all eyes. The stoker was in operation and artistically scattered fine anthracite coal over the foreground, middle distance and background of an improvised locomotive firebox, at regular intervals, after the manner of the most expert of smokeless firemen, if we may be allowed to so designate a "good man," on the left side. The mechanical stoker, however, did what the best fireman in the world could not do, it worked with the fire-door tight shut all the time, though it did not make any pretensions about working the left injector, looking out for signals, or assisting the engineer in other ways. It has been often said that "he is a good man who minds his own business and does what he is told," and we think this stoker stokes exclusively and does so "until further orders." We are also informed that while called the Day stoker it can be used with advantage on engines hauling night trains.

Our esteemed contemporary, the *Railway Age*, says of the R. E. Dietz Company, of New York, that it exhibited "a line of railroad lamps." We only wish to add that we think it also displayed all sorts of "lamps for a railroad line," and if that does not sufficiently illuminate the subject, we are open to further suggestions.

The Economy Car Heating Company, of Portland, Me., had on exhibit an air pump operated by steam, the exhaust from which was passed into a coil of pipes similar to that used in heat-

ing railroad cars. The exhaust steam from the pump is passed first into a reservoir usually carried beneath the cab, from which it finds its way to the car coils. A pressure of about 20 lbs. is maintained in this reservoir for a train of four cars or less. A safety valve in communication with the reservoir prevents the accumulation of back pressure when the pump is working frequently and the weather is mild. On long through trains running in zero weather it may occasionally be necessary to supply steam direct from the boiler; in such an exceptional case the supply is automatically regulated and the boiler is only drawn from when the pressure in the reservoir sinks below that for which the valve is set. Thus live steam only supplements the exhaust, so that in this feature the economy of the whole arrangement is apparent.

The O. M. Edwards Company, of Syracuse, N. Y., had an exhibit which was of great interest, not only to railroad men but to the great long suffering, and at the same time, appreciative travelling public. This company showed models of extension platform trap doors for wide vestibules and open platforms for railway coaches, which appeared to be very satisfactory, in that they worked on the you-press-the-button-and-we-do-the-rest principle. The heart of the old experienced traveller, however, beat faster as he examined railway window sashes which not only moved up with something less than 422.08936 pounds pressure, and when up, stayed up, at any desired height, without rattling or slipping or doing anything which it ought not to do. Further, these sashes when released by the simple pressure of thumb and finger, would come down promptly, quietly and quickly, without stunning or injuring anybody in the car. The blinds were also operated on the same grand general principles of equality for all before the law. An infant might operate these sash and blinds as well as the stalwart soldier, who, though "full of strange oaths," would find their use superfluous, while the "lean and slippered pantaloon" would fairly revel in the ease with which he could adjust sash and blind to his ever changing needs. The fixtures are easily "get-at-able" for cleaning, adjustment and repair, when the latter is required. The word adopted by the company for its trademark, "Paownyc," indicates that some up-to-date roads know a good thing when they see it. The first two letters stand for the well-known Pennsylvania, the next two for the "Ontario & Western," and the last three for the road which runs the Empire State Express along the banks of the beautiful Hudson River. These roads were the first to use the Edwards window fixtures, which "work while you sleep."

Fairbanks, Morse & Co., of Chicago, exhibited a gasoline turntable motor at the Delaware & Hudson's delightful little roundhouse at Saratoga Springs, N. Y. We say "delightful" because we did not wish to rush into print with the word "immaculate," but we would like to say the latter word quietly and seriously in describing a roundhouse, which, while being devoted to "business," is at the same time not devoid of beauty, good taste, and good management. The motor which turned the table could be operated by one man, or a boy for that matter, and it did not require that an engine should be exactly balanced in order to do its work; it took things as they came, which is a very sensible way for any roundhouse appliance to act. It turned the table light, or with an engine, with equal facility. It had a "light" and a "loaded" speed, and it completely did away with bolts, catches, or clamps to hold the table in position while an engine was entering or leaving the table. This we know reads well, but the point that appeals to the practical railway man is the fact that at the moment that the table, loaded with a consolidation, under pressure for time, swings round, as Kipling says, " like a man o' war in the tide," and comes opposite the "outgoing" track the turntable brake stops it and holds it fair, rail to rail, as it moves off, without the usual track-shifting jar, caused by the youngest wiper shooting the catchbolt on the moving table, in order, as he says, after the truck wheels have dropped off, to "save time?!!" The Fairbanks, Morse & Co.'s turntable gasoline motor supplies a very long and grievously felt want, which mechanical department men everywhere will enthusiastically appreciate, when they see it and come to know it at close quarters. It is a time saver, a labor saver and a safety appliance, and in railway operation that trinity spells economy.

The Garry Iron and Steel Company of Cleveland exhibited its revolving pneumatic crane, which, by the way, is the invention of a well-known master car builder. It is understood that this company has taken contracts for revolving pneumatic cranes for the Rock Island Railroad, and for the Canada Atlantic Railway. The company recently shipped a pneumatic painting machine to Russia.

The General Electric Company, of Schenectady, exhibited several machine tools operated by direct connected variable-speed motors.

The Gold Car Heating Company showed car-heating apparatus, duplex coil system and straight steam, in operation on the ground. Various parts of the apparatus were shown separately.

The Goodwin Car Company, of New York, had a beautifully finished model of the Goodwin car, probably one-eighth size, also drawings and photographs.

The Gould Car Coupler Company, of New York, exhibited passenger and freight brake slack adjusters, improved M. C. B. journal boxes, improved malleable draw gear, improved M. C. B. coupler for 100,000-lb. car, and improved locomotive tender for heavy equipment.

The Handy Car Equipment Company, of Chicago, was represented at the convention by a sample handy car which stood on the D. & H. tracks. Full size "Snow" locomotive and car replacers were also on view.

The Lappin Brake Shoe Company, of Bloomfield, N. J., exhibited Lappin brake shoes with and without steel backs, Congdon shoes with various types of inserts with standard Lappin back and with Lappin bridge back and interlocking brake-shoes.

McCord & Co., of Chicago and New York, had on exhibition its well-known axlebox, coil spring damper, the Johnson hopper door and the McKinn gaskett.

The Metal-plated Car and Lumber Company of New York showed a section of a metal-plated passenger car. The plating consists in very neatly and closely covering each piece of exposed wood with sheet copper, and reducing the whole to a pleasing dark tint by a process of oxidation. Mr. W. P. Appleyard, master car builder of the N. Y., N. H. & H., invented the metal-plated car. Its weather-resisting qualities have been shown to be the highest.

The Michigan Lubricator Company, of Detroit, showed its improved triple lubricator No. 3 and automatic steam-chest plugs, air pump cup, and the Michigan Driver brake retainer, a device easily applied to the engineer's brake valve, the object of which is to bunch the train after the brakes have been released, in order to prevent shock and a second application, and also to prevent the train from parting when the brakes have been released, caused by forward end of train surging ahead while brakes may not be fully released on the rear end.

The Monarch Brake Beam Company, Ltd., of Detroit, exhibited Monarch and solid brakebeams, and new interlocking fulcrum for solid beams.

The National Malleable Castings Company, of Cleveland, was on the ground with the Tower coupler.

The Pantasote Leather Company, of New York, had an exhibit in the form of a section of a palace car fitted up with pantasote curtains, beadlinings and upholstery. The company sought to diffuse the good luck it has had in all its business enterprises by the distribution of a replica of the famous "Lincoln imp." This grotesque little figure is on one of the columns of Lincoln Cathedral, England. Tradition says that this imp had the power of expelling all ill luck from the sacred edifice. In distributing this souvenir the Pantasote people hope that "devilish good luck" may be his who possesses Pantasote upholstery or the Lincoln imp.

The Powers Regulator Company, of Chicago, displayed its well-known automatic temperature regulator for passenger cars.

The Pressed Steel Car Company of Pittsburg was not represented this year by any exhibit on the ground or even on the D. & H. tracks, but nevertheless we hear that every day sees a large shipment of steel cars leaving that city from their works, and the company now has on its books orders sufficient to keep the 10,000 men on its payrolls busy for some time to come. Upon a recapitulation made by the officials of the company, it was found that the total number of cars shipped since the industry began four years ago is 40,578. At the present rate of produc-

tion, the company will build this year nearly as many cars as have been constructed since the company's inception. During May, the average output of cars per day was over 100. The company's officials believe that in the future the average will be even greater than in the past.

The Protectus Company, of Philadelphia, showed samples of wood and iron treated with the Protectus paint; a novelty in this line inasmuch as it does protect metal against corrosion.

The Railway Appliance Company, of Chicago, exhibited the Sargent coupling for coupling cars on sharp curves or when pulling off transfer boats, also the Gelman-Brown emergency knuckle, the "D" knuckle of extra hardness and durability, and Economic packing.

The St. Louis Car Company of St. Louis had a display of spiral journal bearings. The two essential features claimed for these bearings are "economy and efficiency"—economy, obtained through the use of a malleable iron shell, and efficiency, by using a high-grade metal where the bearing comes in contact with the journal.

The Safety Car Heating and Lighting Company, of New York, showed car heating and lighting apparatus. Among the appliances handled by the company were some fancy deck lamps, bracket lamps, gas ranges for private cars, and a buoy lantern which could be made to burn steadily or intermittently, as desired.

The Sargent Company, of Chicago, exhibited steel castings of Tropenas metal, consisting of wrenches, hammers, coal picks and oil cups.

The Sterlingworth Railway Supply Company, of Easton, Pa., had upon the D. & H. tracks a steel car, made of structural shapes, built for the N. Y., O. & W. R. R.; it had a hopper bottom, and was of 80,000 lbs. capacity. This company also makes rolled metal brake beams, rolled steel car bolsters and steel freight trucks of I section. The truck which is manufactured under the Joughins and Cliff patents has a hinged pedestal jaw which, while firmly secured in place when car is in service, will yet, by the removal of a few bolts, permit defective wheels to be removed from a car, under load, without jacking up the body—just take the weight, withdraw the bolts, clear the brake gear and out with the wheels. The company is prepared to give Sterling worth to all its patrons.

The Simplex Railway Appliance Company, of Chicago, had on hand samples of the Simplex bolsters for 80,000-lbs. cars and also those designed for 60,000-lbs. cars, and Susemihl frictionless roller side bearings.

The Standard Acetylene Lighting Company, of Springfield, Mass., had a private car, the "Roland," brilliantly lighted with acetylene gas. The car stood on the D. & H. tracks.

The Standard Car Truck Company, of Chicago, showed models of the Barber truck for both steam and electric cars; these trucks are so designed that after being slewed in passing round a curve they will return to normal position when again run upon a tangent. Models of centre plates designed to keep out dust and cinders were also exhibited by the company.

The Standard Coupler Company, of New York, exhibited Standard steel platforms, Sessions' new friction draw-gear, and Standard couplers.

T. H. Symington & Co., of Baltimore, displayed some attractive journal boxes and dust guards.

The Thornburgh Coupler Attachment Company, of Detroit, showed coupler attachments for all classes of cars, with single, double, or triple springs, with or without metal draft arms.

The Standard Paint Company, of New York, displayed car models showing insulation, sheeting and insulating paper, iron and wood preserving paint, and car flooring.

The Standard Pneumatic Tool Company, of Chicago, exhibited the "Little Giant" long stroke riveting hammer, the clipping, caulking and beading hammer, piston air drills, reversible flue rolling, reaming and tapping machines, pneumatic blowoff cocks or bell ringers, staybolt nippers, and various other useful appliances operated by compressed air.

The West Disinfecting Company of New York, showed a complete line of disinfecting appliances, disinfecting fluids, automatic disinfector and spray air pump, for cleaning car floors. Various germicides and sterilizers are finding their way more and more into modern life, and the railway passenger car is receiving attention nowadays, with a view to rendering it a thoroughly sanitary vehicle for the public to travel in.

PERSONALITIES

A. E. Manchester, assistant superintendent of motive power of the Chicago, Milwaukee & St. Paul R. R., has been appointed superintendent of motive power of that road, with headquarters at Milwaukee, Wis., to succeed Mr. S. P. Bush, resigned. Mr. Manchester entered the service of the St. Paul road in 1864, serving five years as machinist and seventeen years as roundhouse foreman at Calmer and Mason City, Ia. From January, 1887, to May, 1889, he was general foreman of the locomotive department of the Iowa & Dakota division, and from the latter date to April 1, 1893, division master mechanic of the Southern District in charge of both car and locomotive departments. He was appointed assistant superintendent of motive power April, 1893.

L. F. Loree, president of the Baltimore & Ohio, has been appointed receiver of the Pittsburg & Western, in place of Mr. John K. Cowan, resigned.

P. S. Blodgett, formerly general superintendent of the Lake Shore & Michigan Southern, has been appointed general superintendent of the New York Central & Hudson River, with headquarters at New York, to succeed Mr. Edgar Van Etten, chosen second vice-president. Mr. Blodgett has been connected with the Lake Shore for many years. He was appointed superintendent of the Eastern division on August 12, 1890, and was assistant general superintendent from January, 1892, to March 1, 1896, when he was made general superintendent.

W. H. Newman, president of the Lake Shore & Michigan Southern, was chosen president of the New York Central & Hudson River at a special meeting of the board in New York on June 3 to succeed Mr. S. R. Callaway, resigned. Mr. Newman, who is fifty-four years of age, has been in railway service since July, 1869.

George L. Potter, general manager of the Pennsylvania Lines west of Pittsburg, has been appointed general manager of the Baltimore & Ohio, and Mr. Arthur Hale, superintendent of telegraph of the Pennsylvania Railroad, has been appointed assistant general manager of the B. & O., both with headquarters at Baltimore, Md. Mr. Potter served an apprenticeship with the Pennsylvania Railroad, and from 1882 to March, 1893, was successively assistant master mechanic and master mechanic of the Pennsylvania's shops at Fort Wayne, Ind. In March, 1893, he was appointed superintendent of motive power of the northwest system of the Pennsylvania Lines, and in November, 1899, was made general superintendent of motive power of all the lines west of Pittsburg, which position he held until January 1, last, when he became general manager. Mr. Hale has been connected with the Pennsylvania Railroad since 1882, and has been superintendent of telegraph since 1898.

It is announced that O. D. Ashley, for many years president of the Wabash, will be made chairman of the board at the annual meeting on July 20, and that Joseph Ramsey, Jr., now vice-president and general manager, will be chosen to succeed him as president.

William Cotter, who has just resigned as superintendent of the western division of the Grand Trunk, has been appointed general superintendent of the St. Louis, Iron Mountain & Southern, with headquarters at St. Louis, Mo., to succeed J. M. Herbert, who, it is stated, is to go to the Southern Pacific.

James Collinson, heretofore acting assistant superintendent of machinery of the Atchison, Topeka & Santa Fe, has been given the title of general master mechanic, with headquarters at Topeka, Kan. Milton Player, roundhouse foreman at San Bernardino, Cal., has been appointed master mechanic of the eastern division, with headquarters at Topeka, Kan., to succeed G. C. Neubert, deceased.

C. C. Farmer, general air brake instructor of the Central Railroad of New Jersey, has resigned that position to accept the position of air brake inspector of the Westinghouse Air Brake Co., at Pittsburg, succeeding Robert Blackall, who has been made general foreman of the finishing department of the Westinghouse Company, at Pittsburg.

John K. Cowan having retired from the presidency of the Baltimore & Ohio, it is announced that he will continue with the road as a director and as general counsel, succeeding Seward, Guthrie & Steele, of New York.

T. E. Adams, formerly master mechanic of the Eastern Railway of Minnesota, has been appointed general master mechanic of the St. Louis Southwestern, with headquarters at Pine Bluff, Ark.

W. L. Harrison, formerly superintendent of shops, Eastern Railway of Minnesota, has resigned, to accept a similar position with the St. Louis Southwestern at Pine Bluff, Ark.

Daniel Willard, for over two years past assistant general manager of the Baltimore & Ohio, has been appointed assistant to the president of the Erie, with office at New York.

W. E. Singleton, who has heretofore been acting master car-builder of the Florida East Coast road, has been appointed master car-builder.

W. A. Nettleton, superintendent of motive power of the Kansas City, Fort Scott and Memphis, has tendered his resignation to take effect on July 1, when the above road is merged with the St. Louis & San Francisco.

J. S. Chambers has been appointed superintendent of motive power of the Atlantic Coast Line, with headquarters at Wilmington, N. C. He will have charge of the machinery and car departments, and master mechanics and master car-builders will report to him.

James L. Taylor has resigned as third vice-president of the Consolidated Railway Electric Lighting & Equipment Company, of New York, to engage in other business.

F. A. Delano has been appointed manager of the Chicago, Burlington & Quincy. He was born September 10, 1863, at Hong-Kong, China. After graduating from Harvard, he entered the railway service in 1885, as an apprentice in the machine shops of the Burlington at Aurora. From 1887 to 1889 he was in charge of the bureau of steel-rail inspection, tests and records of the road, afterward becoming assistant to the second vice-president. That position he held until July, 1890, when he was appointed superintendent of the company's freight terminals at Chicago, holding this position until Feb. 1, 1899, when he became superintendent of motive power.

J. F. Deems, who is now assistant superintendent of motive power of the Chicago, Burlington & Quincy, will succeed F. A. Delano as superintendent of motive power.

The Canadian Pacific Railway announces the following changes in the mechanical department: G. S. MacKinnon, master mechanic, has been moved from West Toronto Junction to Winnipeg, Man.; C. R. Ord goes from Winnipeg to McAdam Junction, N. B., and J. R. Spragge leaves McAdam Junction to take up his abode at Toronto Junction. These changes are consequent upon similar transfers of general superintendents which recently took place upon this road.

John Wohrle, formerly general foreman of car department of the Columbus, Sandusky & Hocking R. R., has been appointed to the newly created office of chief joint car inspector at Columbus, Ohio.

Car Lighting by Acetylene Gas

The Acetylene Gas Car Lighting Co. had a very good practical example of what it can do shown as an exhibit at the conventions. It consisted of a private car, the "Roland," fitted up and lighted by this wonderful illuminant. The generator occupied a very small space, and appeared to be very simple in construction and operation. The light is said to be as cheap as oil and quite safe. Anyone who went to the car in order to express an opinion upon car lighting probably found that, in this instance, the company was able very satisfactorily to give "a 'Roland' for an Oliver."

"Vulcabeston for Mechanical and Steam Uses," is the title of a 3½ in. by 6 in. pamphlet issued by the H. W. Johns Mfg. Co., of New York, setting forth the good properties of this material. The principal uses to which it is put, are for electrical insulation and packing. It is suited to the former because, being composed almost entirely of asbestos, it possesses the property of great heat resistance and, as it is made into any desired form, from the thinnest sheet to the largest insulating piece, it is adapted to all requirements. When used as a packing, the composition of the material is the same as before, with the addition of lubricants, which render it pliable and yielding. It can be moulded into any form of gasket or packing and can be used for steam, acids or gas. The pamphlet contains a long list of standard sizes of gaskets and packings, that are manufactured in quantities and held in stock, and closes with some testimonials received from railroad officials as to the efficiency of this type of packing.

The Inventors' Manual

The object of this work is to give the inventor and patentee some hints on patents generally, together with information on ways of exhibiting inventions, bringing them to public notice and effecting sales. The book opens with a few remarks on the "Faculty of Inventing," which is followed by a chapter on inventor and invention. In this the broad distinction is drawn between patents which require great capital for their promotion—such as the Bessemer steel process or the Westinghouse air-brake—and those which "fill a long-felt want" in the family circle, such as the shoelace hook or the rubber-tipped pencil, or perhaps the "unblowable-out match" for smokers. The writer says that some people say "if some one would tell us what is needed we would invent it," forgetting that the principal secret of invention is to find out this very thing.

Several chapters are then devoted to the mode of procedure to be followed in getting a patent, and explanation is given of caveats and records of invention, the development of the invention, form of agreement, and how to exhibit one's patents in the best way. Some space is devoted to foreign patents, paragraphs on who may patent and how are given of twenty foreign countries, all arranged alphabetically. The laws relating to patents passed by the Fifty-fifth Congress are given. This is succeeded by a short chapter on the value of newspaper notoriety. A number of miscellaneous chapters, giving practical information follow, together with a number of forms. The book closes with a table giving the twelfth census of the United States, an alphabetical index of contents and a few blank pages to be used for memoranda. The book ought to be most valuable to all who have to do with patents and patented articles in any way. The book contains 115 pages, and is sold for one dollar by Norman W. Henley & Co., 132 Nassau St., New York.

Narrow Gauge Railway Materials

Catalogue No. 41, from Mr. Arthur Koppel, whose New York offices are at 66 Broadway, is the first issued in 1901. It contains lists of track bolts, spikes, rail sections, steel ties, portable track sections, both straight and curved, rail joints, switches, frogs, switch stands, small turn-tables suitable for trucks, wheels, axles, dump cars of all kinds, and freight cars suitable for narrow gauge railways, together with some light passenger cars. The last few pages contain half tones showing his cars and other appliances as used in the Transvaal, Sumatra, Mexico, Cuba, Russia, New South Wales, Java, Germany and in Asia in the dominions of the King of Siam.

The Bullock Electric Manufacturing Company, of Cincinnati, and the Wagner Electric Manufacturing Company, of St. Louis, have effected a combination of their selling organizations. By thus combining forces in the field, they are mutually benefited, inasmuch as the products of the two companies are totally different, and where the product of one is used, the other is likely to be necessary.

The product of the Bullock Company consists of a complete line of direct and alternating current machines, from a ½-horse-power motor to a 10,000 K. W. generator; controllers of various types and rotary transformers.

The product of the Wagner Electric Manufacturing Company covers a full line of static transformers of all types and of the largest sizes; ammeters, voltmeters, indicating wattmeters, switches, switchboards for all purposes and single phase, self-starting alternating current motors. The entire absence of complicated starting mechanism especially adapts the Wagner single phase motor to the pumping plants and machinery of like character.

The McCord *March*, composed by Mr. William *May*, was played by the band, before that *August* body, the M. C. B. Association in *June*. It may be *months* before we hear the music again, but the McCord axle box may be seen everywhere on railroads, and at any time.

Record of New Equipment

Ordered during the Month of June 1901

CARS

Ordered by	No.	Class.	To be built by
Alabama Gt. South.	100	Box.	Am. Car & Fdry. Co.
Alabama & Vicksburg.	1	Coach.	" " " " "
Algoma Central	50	Hopper.	Pressed Steel Car Co.
Am. S. & R. Co......	15	Dump.	Ingoldsby Auto. Car Co.
Atlantic Coast Line..	100	Freight.	Own shops.
Australian Governm't.	250	Gondola.	Pressed Steel Car Co.
Bessemer & Lake E..	10	Freight.	Erie Car Works.
Bryan, Mr. E. A......	20	Tanks.	Laurel Hill C. & C. Co.
Canadian Pacific......	100	Box.	Own shops.
Chicago & Alton......	400	Steel.	Pressed Steel Car Co.
Chicago City Railway.	120		St. Louis Car Co.
Chic., Mil. & St. Paul.	4	Sleepers.	Pullman Car Co.
Chicago Gt. Western.	2	Dining.	Barney & Smith.
" " " .	200	Freight.	Illinois Car & Equip. Co.
Chic., St. P., M. & O.	2	Coaches.	Pullman Car Co.
Char. Clen. & Sut...	50	Freight.	Am. Car & Fdry. Co.
Cin., Hamil. & Day..	2	Coaches.	Barney & Smith.
Choc., Okla. & Gulf..	8	Coaches.	Am. Car & Fdry. Co.
" " " " ..	15	Partition.	" " " " "
" " " " ..	5	Chair.	" " " " "
Colo. Fuel & Iron Co.	30	Flat.	" " " " "
" " " " "	280	Dump.	Ingoldsby Auto. Car Co.
" " " " "	20	Steel Dump	" " "
Fla. East Coast......	325	Freight.	Southern C. & F. Co.
Grand Trunk.........	300	Furniture.	Own shops.
" "	200	Box.	" "
General Electric......	3	Freight.	Am. Car & Fdry. Co.
Gorman & Co.........	13	Freight.	" " " " "
Hammond Iron Wks..	7	Freight.	Erie Car Works.
Harris, H. E.........	4	Freight.	" " "
Inter. of Canada.....	50	Freight.	Rathbone & Co.
Illinois Central.......	300	Refrig.	Am. Car & Fdry. Co.
Iroquois Iron Works.	4	Freight.	Erie Car Works.
Knapp, J. N.........	10	Freight.	" " "
Lake Sup. & Ish....	1	Private.	Pullman Car Co.
Louis. & Nash.......	250		Own shops.
Manhattan Elevated..	100	Motor.	Wason Mfg. Co.
Mexican Central......	100	Flat.	Pullman Car Co.
" "	50	Box.	" " "
Minn. & St. Louis....	1	Comb.	Am. Car & Fdry. Co.
Mex. Coal & Coke Co.	20	Coal.	" " " " "
Mich. Carbon Works..	1	Freight.	" " " " "
Miss., Kan. & Tex...	30	Passenger.	Saint Charles Car Wks.
N. Y. Cen. & Hud. R.	1,000	Box.	Pullman Car Co.
Northern Pacific......	32	Cabooses.	So. Balt. Car Works.
New Union Sand Co..	5	Dump.	Ingoldsby Auto. Car Co
New O. & Northeast..	100	Freight	Southern C. & F. Co.
Ozak & Cherokee.....	2	Coaches.	Barney & Smith.
Phila. & Reading....	500	Steel.	Cambria Car Co.
" " "	1,000	Gondola.	Pressed Steel Car Co.
" " "	100	Flat.	" " " "
Pennsylvania	2,000	Passenger.	" " " "
Queen & Crescent....	2	Box.	Am. Car & Fdry. Co.
S. P., Los. A. & S. L.	50	Box	Pullman Car Co.
" " " "	100	Flat.	" " "
St. L., Troy & East..	200		Am. Car & Fdry. Co.
St. L. Southwestern..	1,000	Box.	" " " " "
Southern Pacific......	30	Chair.	Pullman Car Co.
" "	20	Coaches.	Am. Car & Fdry. Co.
" "	100	Ballast.	Rodgers Ballast Car Co.
Sierra Valley.........	24	Freight.	Carter Bros.
Shreve. & R. R. Val..	30	Flat.	Am. Car & Fdry. Co.
Tol., Peor. & West...	50	Freight.	Mt. Vernon Car Mfg. Co.
Terra H. & Ind......	2	Coaches.	Am. Car & Fdry. Co.
Vicks. & Shr. & Pac..	1	Cafe.	" " " " "
Vera Cruz & Pacific.	30	Freight.	" " " " "
Wabash	1,000	Box.	" " " " "
"	500	Flat.	" " " " "
Wells-Fargo Ex. Co..	10	Express.	" " " " "

LOCOMOTIVES

Ordered by	No.	Class.	To be built by
Ala. & Vicksburg.....	2		Baldwin Loco. Works.
Boston & Albany.....	6		Schenectady Loco. Wks.
Boston & Maine......	6	Passenger.	" " "
" "	24	Freight.	" " "
Bush Co., Ltd........	1		Baldwin Loco. Works.
Butte, Ana. & Pac...	1		" " "
Choctaw Northern....	4		" " "
Colum. & Puget Sd..	1		" " "
Copper Range........	1		Schenectady Loco. Wks.
Del., Lack. & West...	10		" " "
Gulf & Ship Island...	1		Baldwin Loco. Works.
Illinois Central.......	15	Moguls.	" " "
Ind., Ill. & Iowa.....	10		" " "
Lehigh & New Eng..	2		Cooke Loco. Works.
Lehigh Valley........	17		Baldwin Loco. Works.
Miss. Riv. & B. Terre	3		Richmond Loco. Works.
Miss., Kan. & Texas..	10		Schenectady Loco. Wks.
Miss. Pacific..........	25		Brooks Loco. Works.
New., Dutch. & Conn.	1		Baldwin Loco. Works.
N. Y. Cen. & H. Riv..	52		American Loco. Co.
N Y., O. & West.....	4	Consol'n.	Cooke Loco. Works.
N. Y., Chic. & St L..	10	Consol'n.	" " "
New Zealand Government	13		Baldwin Loco. Works.
Pere Marquette......	10		Brooks Loco. Works.
Pitts. & Lake Erie....	2		Pittsburg Loco. Works.
Rich., Fred. & Pot....	4	10-wheel.	Richmond Loco Works.
S. P., Los. A. & S. L.	3		Brooks Loco. Works.
St. L. & San Fran...	5	Consol'n.	Dickson Loco. Works.
Southern Indiana.....	2	Switchers.	Baldwin Loco. Works.
" "	2	8-wheel.	" " "
So. Miss. & Ark......	1		Pittsburg Loco. Works.
Southwest. of Arizona	1		Baldwin Loco. Works.
Virgina & Truckee...	1		" " "
W. V. Short Line.....	2		Manchester Loco. Wks.

MISCELLANEA

The Powers Regulator Co., Chicago, has furnished its temperature controlling apparatus to the Grand Trunk, Canadian Pacific, Canada Atlantic and the Intercolonial Railway of Canada. These roads report that the apparatus is working satisfactorily. The Chicago & Northwestern and Lake Shore & Michigan Southern, after a trial of two years, have adopted the Powers system and other roads have it on trial.

The Sterlingworth brake-beam has been specified for 2,750 cars recently ordered by the Southern Railway and 1,500 cars ordered by the Wabash.

The J. H. Day Co. have purchased the plant of the Cincinnati Radial Drill Co. and will use the entire plant in the manufacture of the "Kincaid Locomotive Stoker." A company will be incorporated, and the business will be conducted hereafter under the name of the Day, Kincaid Stoker Co.

The United States Railway Equipment Company, of St. Louis, Mo., has been incorporated by Clarence H. Howard, Geo. B. Leighton, J. M. Harrison and others.

The automatic frictionless side bearings of the Chicago Railway Equipment Company, Chicago, have been specified on four hundred 50-ton steel cars, to be made by the Pressed Steel Car Company, for the Chesapeake & Ohio. The Pullman Company has adopted the Diamond special brake beam of the Chicago Railway Equipment Company for high-speed brake service, and will be used on cars for this class of service.

The Consolidated Railway Electric Lighting and Equipment had a smoking baggage car on exhibition at the convention. The car is arranged for "lighting from the axle," as it is called. The system consists of a small generator carried on the truck, driven directly by a belt from a drum secured to the axle. The generator is connected by wires to a regulator, which is an exceedingly ingenious piece of mechanism, and is carried in a small cupboard in the baggage end of the car, where also the various switches are placed. The action of the "axle light" is, briefly, this: when running in the daytime the motor is storing energy in a secondary battery, and at night, when the car is in motion, the rotation of the axle supplies current direct to the lights. When the train begins to slow down preparatory to a stop, the regulator automatically turns the current from the battery to the lights, and as the train gains speed again the regulator turns on the required current from the generator and shuts off that from the storage battery. When in motion current from the axle generator, if over and above that required for the light, passes into the storage battery. One of the most delightful features of this system is the use of electrically driven fans which keep the air of the car in motion, and as a cooling and ventilating device it is of the utmost value. Its use, in a smoking car, above all others, will appeal very strongly to that large, and, may we not say, influential, section of the travelling public, the users of the weed. The "axle light" people give a good, steady light to read by at night; cool, well ventilated cars day and night, and comfort to everybody.

The American Car and Foundry Company has purchased from the Jackson & Sharp Company, of Wilmington, Del., the entire plant, good will and existing contracts of the Delaware Car Works, which will be operated by the new owners on the same lines as heretofore. The plant will be in charge of Mr. Charles S. Gawthrop as district manager.

RAILROAD DIGEST

Formerly The Railroad Car Journal

ENTERED AT THE NEW YORK POST OFFICE AS SECOND-CLASS MATTER.

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EDWARD A. PHILLIPS GEORGE S. HODGINS, Editors

Vol. XI AUGUST, 1901 No. 8

A Wise and Liberal Policy

Mr. E. P. Ripley, President of the Atchison, Topeka and Santa Fe Railway, is the author of an educational policy, which, on that extensive system, has been productive of most beneficial results. In fact so much satisfaction has been experienced in the matter that it has been decided to extend its sphere of usefulness. It is reported that four new reading rooms will be established at as many divisional headquarters, thus bringing the total number up to twenty-three. These reading rooms are supplied with abundance of reading matter, both general and technical, as well as with means for recreation, and baths are also provided. That education has a commercial value is pretty generally admitted, but nowhere has the truth of that fact received such striking confirmation as in railway service. Experience has demonstrated that a man's services to a railroad are almost in exact proportion to his intelligence. Almost every railroad, which makes any claim to be abreast of the times, has its air-brake instruction car, and some of them have added car heating to the subjects taught. Explanation of appliances such as the injector, sight feed lubricators, etc., are also given. Some provide means for instruction in that most important subject, First Aid to the injured. These facts are mentioned simply to show that education in some form or other has become a necessity among the rank and file of railroad service.

The people of the United States are a reading people; and President Ripley has turned the desire to read and gain information, which exists among railroad men, to good account, by providing them with the means to gratify what is a natural desire of progressive mankind. That the Santa Fe system is benefited by the wise and liberal policy inaugurated by its executive head, goes without saying, but the country at large is also benefited by the growth of intelligence among its citizens.

American vs. British Locomotives

The newspaper war concerning the relative merits of the British and American locomotives, which was stirred up by Sir Alfred Hickman's attack upon the British Government, has produced on the whole some valuable criticism upon British and American machines. The controversy has, however, demonstrated the fact that more data is necessary before any very satisfactory conclusions can be drawn. The charge is made that the British engine driver is prejudiced, and therefore all tests of American engines made across the Atlantic must be one-sided and worthless. In this connection is it not well to ask, Would an American locomotive runner be any more free from prejudice, if English engines had been imported to this country, with a great flourish of British trumpets and at a time when the press of the United Kingdom had been more or less jubilantly predicting our speedy industrial decay?

In some aspects the discussion resembles a debate on the question, Is a bird better adapted for flying than a fish is for swimming? We build engines to suit our needs, and our friends across the water do likewise. We prefer outside cylinders, outside connected engines, bar frames, careful finish only where we consider finish essential, and a general form of construction which renders all the various parts of our engines easily accessible. British engineers prefer inside cylinders and crank axles, slab frames, very careful finish all over, and a form of construction which gives to their engines a neat and compact appearance, but which does not render them "get-at-able."

As to the charge that American engines use more oil than British, we do not think sufficient proof has been offered. In the matter of repairs further data is undoubtedly required, but in the matter of coal consumption, the weight of opinion is that American engines do burn more coal than those of English make. A very good reason has been given in explanation of this fact—it is, briefly, that we would rather haul a few more cars, even if we burned coal less economically to do it. Some years ago a writer in an English magazine was comparing the performance of two rival lines on that side of the water. He pointed out the fact that the trains of one company were more often late through stress of weather than those of another, and the reason he gave was that one company paid a premium to its engine drivers for saving coal, and, to the other, "getting in on time" was the point it considered important. Each had a separate object, and each apparently realized its desire. Some years ago a Webb compound engine was brought to this country and tried upon the Pennsylvania Railroad. It was considered anything but satisfactory, yet the Webb engines appear to do all that is expected of them on the London & Northwestern Railway.

The systems of railroading, the methods of doing things, and even the considerations which are deemed important, differ materially in the two countries, yet each species of engine seems to thrive in its own habitat. The only fair way to test the relative merits of British and American engines would be for engineers of both countries to study the conditions prevailing in each land, each to design and build engines to fully meet those conditions, and then exchange products and carefully note results for an extended period of time. As it is now American builders work on English specifications up to a certain point and so build an engine for a certain service which they would not be asked to design for the same sort of service in this country.

Uniform Section for Car Siding and Roofing

The committee appointed to consider this subject, said in its report:

"It has become very evident that if the Master Car Builders' Association and the car builders generally would adopt and use sections for flooring and siding, roofing and lining, which approximated closely, as far as rough sizes are concerned to the commercial sizes put in buildings, a reduction in price per thousand feet could reasonably be expected, and orders could be filled more promptly."

That sentence contains the gist of the whole matter from the railroad point of view. Manufacturers are also anxious for a standard to be arrived at in this matter. The *American Lumberman*, a resume of whose article is given elsewhere, says that the wishes of manufacturers should be consulted in the settlement of a standard section. It further remarks, "standard goods should be made to standard dimensions, and the advantage of any manufacturer should rest on quality of material and workmanship, rather than on any speciality in the location of tongue or groove."

Both parties to the bargain see advantages to be gained by co-operation. The M. C. B. Association sees reduction in cost and prompt delivery of goods, with the incidental advantage of a reduction in the amount of stock carried. The *Lumberman's* proposal is eminently fair and to the point. Manufacturers

should be consulted in deciding upon a uniform section, and they will then stand on the quality of their goods alone with an incidental reduction in the cost of production for themselves. This state of affairs is very satisfactory, and reminds one of the opinion expressed regarding an American election by a character in one of Hoyt's plays, Mr. Boyle Dowl, to-wit. This gentleman appeared to think that in order to constitute a really first class election there ought to be "something in it for everybody!"

That is very much the way the matter of standardizing car stock stands at the present moment. There is a field for the committee to work in, with the assurance of the co-operation of men in the lumber trade. Both have material interests to serve by a satisfactory adjustment of the whole matter. Men on the railways who have to do the actual work of repairs to cars, though they may have no voice in the settlement of the question, are, nevertheless, sure to heartily applaud the result.

Looking at Things and Not Seeing Them

The remarks of Mr. Rhodes and Mr. Symons on the topical discussion regarding eyesight and hearing of car inspectors at the M. C. B. convention were exceedingly interesting and one may say, instructive. The work of Prof. Raymond Dodge is referred in a recent issue of the *Literary Digest* which quotes from the New York *Evening Post*, as follows: "In order to see any object at rest, the eye must remain motionless looking at some definite part of it for an appreciable length of time. If the eyes move, they see nothing for about one-twentieth of a second. This explains the success of those slight-of-hand tricks in which rapid movements of the fingers are absolutely unseen, while the eyes follow the larger movements of the hand. It also explains the necessity of looking at a relatively fixed point in boxing, fencing, etc. Prof. Dodge also demonstrated that the eyes do not move regularly over a page as we read, but make a series of distinct pauses as they sweep along each line of print, the eyes see the words only during the pauses."

There is little doubt that a car inspector, who carries on his work by a series of definite glances, passing, after a slight pause from one object to another, will probably make a good inspector. There is no such thing in railway work of taking a general or comprehensive survey, or a "bird's-eye view," as some people somewhat incorrectly call it. Careful inspection is the piling up of the results of a large number of separate glances directed at specific objects.

Further than this the mind must be concentrated upon the object as well as the eye, and the co-operation of eye and brain in this case may be called observation. It is, in our opinion, not so much a question of a man not seeing a thing as it is that he may "see and not perceive," or if we may so say, he may "look at a thing and not see it." We remember hearing of two students who on their way to and from the university used to make it a practice to keep up a friendly competition for the purpose of sharpening their powers of observation. The method of procedure was for the first to stop at a shop window and take a mental inventory of its contents, while the other endeavored to do the same as he walked past. Afterward the one who had looked in while walking enumerated all he had been able to concentrate his mind upon, while the other with fuller knowledge corrected. The process was constantly repeated, each being alternately inspector and judge. Proficiency grew with practice, and it is quite possible that though both had looked at the objects in the window, the ability to see them all was a gradual process.

The thing that is required of those who, on railways, look to see if work has been correctly done, is to cultivate the Sherlock Holmes style of observation, in which the eye not only looks at a thing, but informs the mind of the true state of the case, usually by an inference or deduction. An example will make this clear.

On one occasion a car was put upon the repair track of a certain railway, the work to be done was to "tighten up the draw timbers," they being at one end of the car about a quarter to three-eighths of an inch away from the center sills. The car was in due time reported O. K. The inspector who was responsible inspected this car after the work had been done. He found that the draw timbers were properly in place and all appeared regular. Two bolts, however, had a little earth adhering to the threads below the nuts and the threads were rusty all the way up to the nuts. He at once surmised that the work had not been properly done. He knew that the sealed car had not been opened, that the work was said to have been finished just at "quitting time." He therefore interposed a chisel between nut and timber in each case and drove it in, with the result that two old short bolt ends without heads dropped out, revealing the fact that the timbers had been jacked up, and these dishonest "dummies" had simply been driven in. Inspection without the Sherlock Holmes method of observation would never have revealed the trick, and if he had simply looked at the array of nuts on the underside of the draw timbers and the line between timbers and sills he would not have "seen" the real state of the case.

AIR BRAKES AND ELECTRICAL EQUIPMENT AT THE PAN-AMERICAN EXPOSITION

As being of more than ordinary interest to railroad men, as well as to mechanical and electrical engineers generally, the opportunity afforded by the Westinghouse Companies' Publishing Department is here taken advantage of to publish an illustrated description of the elaborate exhibits made at the Buffalo Exposition by the several constituent companies of the Westinghouse manufacturing interests.

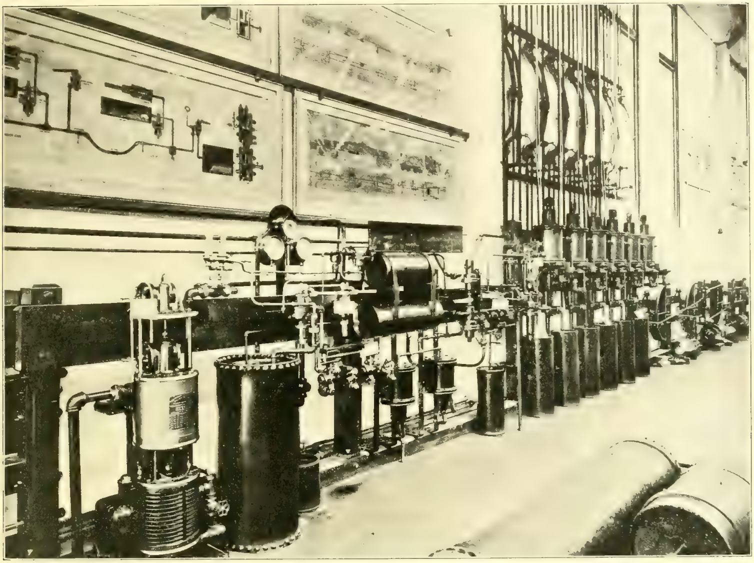
No reader of this article needs to be told that the safety and comfort of railroad passengers are in a large measure due to the Westinghouse air brake, which for thirty years has been the standard appliance for arresting the motion of trains. One million two hundred and fifty thousand of these brakes are now in service throughout the world. Many are also acquainted with the very extended use of the steam and gas engines built by the Westinghouse Machine Company. Those who use electrical machinery, whether for lighting, power or traction, know the apparatus built by the Westinghouse Electric and Manufacturing Company. Equally well known are Westinghouse, Church, Kerr and Company, whose work practically covers the entire field of engineering as applied to power systems and their application to transportation, lighting and industry; the Union Switch and Signal Company, manufacturers of every known variety of automatic and semi-automatic railroad signals—makers of frogs and switches and of mechanical, pneumatic and electrical interlocking mechanisms of all kinds; the Sawyer-Man Electric Company, makers of incandescent lamps, whose product has been on the market for over twenty years—these are the Westinghouse companies that have joined in a common exhibit.

The exhibits of these companies have been placed beneath the central dome of the Electricity Building and to the right and left of the main entrance to the Railway Exhibits Building.

The operation of two gas engine generating sets is one of the features of greatest interest in the Electricity Building. The large unit consists of a 300-horsepower three cylinder, four cycle gas engine, direct coupled to a 2,200 volt, two-phase, revolving field alternator. The smaller unit is a three cylinder, four cycle gas engine, direct connected to a 125 volt direct current generator. The power furnished by the large unit is employed partly in supplying current to 130 Nernst lamps at 220 volts, and partly in operating numerous Westinghouse induction motors applied to stationary service.

Of transformers, there are to be seen a complete set of the company's O. D. transformers, from 1-4 to 50 kilowatt; two sizes of manhole type transformers, and two 100 kilowatt self-cooling, oil insulated transformers. The latter are used to lower the voltage of the 180 K. W. machine from 2,200 to 110 volts, at which potential they supply the four incandescent signs.

One of the most novel attractions in the Electricity Building is a high voltage sign. It consists of two large glass plates covered on the back with metal foil, with the name "Westinghouse" in its center. An alternating pressure, having a maximum of 10,000 volts, is applied between the foil on the back and



WESTINGHOUSE AIR BRAKE COMPANY'S EXHIBIT OF HIGH SPEED BRAKE FOR SIX CAR PASSENGER TRAIN.

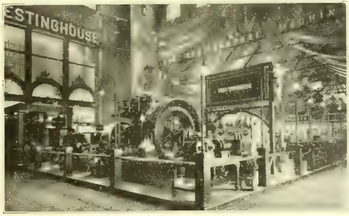
the metal letters on the front. As the potential is raised a fringe of violet light appears about the letters which, gradually increasing in intensity, culminates in a myriad branches lightning discharge that plays continuously over the surface of the plate and is accompanied by a continuous crash not unlike thunder.

Among the railway motors included in the Railway Exhibit are a Westinghouse 56 motor, for heavy suburban and interurban service; a 50-C, for heavy railway service, and a 69 motor for city and subrban service. The 50-C motor is provided with a special cradle suspension from the car axle, thus removing the weight of the motors from the car trucks. This arrangement minimizes the wear of the rails, increases the life of the wheels and, what is more important, makes an easy riding car.

The company also exhibits a complete line of detail apparatus, including motors, lighning arresters, fuse blocks, switches, circuit breakers, etc. Included in this comprehensive and interesting exhibit are two large revolving photograph stands, containing a great number of pictures, which illustrate engineering work of importance, as well as various electrical and mechanical installations of the several companies.

Passing now to the Railway Exhibits Building, which is properly defined as containing all flanged wheel exhibits, we find in the southeast end of this building the exhibit of the Westinghouse Air Brake Company. A rack, representing a six-car train, including the locomotive, is equipped with the high speed brake. This installation shows the proper method of application and operation. An attendant is present who operates it and fully explains its merits. Each part is duplicated and cut in sections and connected in tandem to its relative part, so as to show every feature of its application. One of the interest-

CAR EQUIPPED WITH WESTINGHOUSE ELECTRIC BRAKE AND HEATER SYSTEM FOR DOUBLE TROLLEY OVERHEAD RETURN OR SINGLE TROLLEY GROUND RETURN—RAILWAY EXHIBIT.



WESTINGTHOUSE EXHIBITS IN THE ELECTRICITY BUILDING.

UNION SWITCH AND SIGNAL COMPANY'S EXHIBIT — RAILWAY BUILDING.

ing points of this arrangement is the 9 1-2 inch air pump, top-head cut in section and working in unison with the top-head on an operating pump, showing in detail the movement of the very simple valve motion of this device.

The air is supplied by four motor-driven duplex air compressors, which are also part of this exhibit. The compressors are especially adapted to supply compressed air for air brakes on electric motor vehicles, as well as various other industrial uses. A complete equipment of both the straight air and the storage system of air brakes for electric cars is so arranged on the platform as to show their application to the car.

The American Automatic Slack Adjuster, in addition to being shown in connection with the six-car high speed brake train, is also attached to the cylinder on a neatly designed model engine truck, likewise a model locomotive frame with three pairs of drivers connected, and a complete equipment for a passenger car. These models are so designed as to show the proper method of applying this device to the standard equipment, and its operation in automatically regulating the brake piston travel.

UNION SWITCH AND SIGNAL CO. AND WESTINGHOUSE AIR BRAKE CO. LENGTH OF EXHIBIT AREA 200 FEET.

WESTINGHOUSE FRICTION DRAFT GEAR.

The Westinghouse friction draft gear, suitably mounted on full size models of draft rigging, which show its application to different forms of cars, both of the wooden and the pressed steel type, is on exhibition. There are also on view complete full-sized apparatus cut to show in detail its mechanical construction. The gradual absorbing of the shocks and the practical freedom from spring reaction which the Westinghouse friction draft rigging gives makes it nearly impossible even in severe service to break a train in two or to break its draft gear. The great saving power of this device is at once apparent when it is recollected that from 30 to 70 per cent. of all crippled cars owe their condition to defective draft rigging.

ELECTRIC POWER BRAKE AND CAR HEATING APPARATUS.

The Westinghouse electric brake and car heating apparatus shown in full operation approximates the ideal brake for electric cars. The apparatus consists of two elements—a brake and a car heater. The brake may be installed and used independently of the heater, but the operation of the heater is dependent upon the use of the brake, the produced heat being derived from energy that would otherwise be wasted. This combination of a magnetic track brake with a wheel brake of maximum power produces a braking effect greatly in excess of any heretofore attained. Moreover, cars equipped with the complete apparatus are heated without using the line current and, therefore, without cost for the electrical energy employed in heating.

When in action powerful magnets force the brake friction shoes upon the rails and set up a strong magnetic attraction between the shoes and the rails, while at the same time the drag or back action of these magnet shoes throws in action a system of levers that apply to the wheels' brake shoes of the regular type.

A double truck of the maximum traction type, equipped with two 40 horsepower motors and with the electric brake, is operated on a short section of track by a stationary controller. This equipment shows the enormous braking power of the apparatus and the absolute freedom from skidding of the wheels.

THE WESTINGHOUSE AUTOMATIC AIR AND STEAM COUPLER.

This arrangement, as its name indicates, is so designed that the air and steam pipes usually carried underneath the cars are coupled automatically whenever the cars themselves are coupled, and with even greater certainty, there being no locks, catches or other parts which require manipulation by the train

men. In coupling it is only necessary to push the cars together, and when uncoupling to pull them apart. This device permits cars to be coupled or uncoupled with the maximum rapidity and certainty, and makes it unnecessary for trainmen to go between the cars. Arrangements are provided for opening and closing, from the side of the car or the platform, the cocks in the train pipes.

EXHIBIT OF THE UNION SWITCH AND SIGNAL COMPANY.

The space occupied by the Union Switch and Signal Company contains three of the most important signalling systems owned and manufactured by them—the Westinghouse Electro-pneumatic Interlocking and Signalling System, the "Wireless" System of Automatic Electric Block Signalling, and the High Speed Electric Train Staff System.

Several of the separate appliances used in these systems are on view, including semaphore mechanisms and motors, battery chutes, relay boxes, cranks, wheels, jars, etc.

Photographs and drawings of various appliances and plants built and installed by the Union Switch and Signal Company, together with a view of their new and greatly enlarged works at Swissvale, Pa., are also a part of the exhibit.

Blast Pipe and Counter Pressure Brake on 2-8-0 Japanese Engine

Referring to a paragraph about an eight-coupled goods locomotive on the Japanese Government railways, which appeared on page 98 of our March issue, Mr. R. F. Trevithick, locomotive superintendent, writes us from Kobe: "As the *Engineer* states, the engines are fitted with an arrangement of blast pipe and valve both simple and novel and easily applicable to outside cylinder engines of English design. The casting on which the smoke boxes of American engines rest would perhaps be a somewhat serious obstacle to its adoption on your locomotives, except of course in the case of engines built to embody the means of using the counter pressure brake. However, I believe the use of the counter pressure brake to be good practice on engines running down long and steep gradients at low speeds. I have pleasure in sending you a blue print of the contrivance on the chance that should you see fit to reproduce it in your esteemed journal it may be of service to some of your readers."

[The counter pressure brake referred to is similar to what has been called the water brake in this country, and used on mountainous sections. A jet of hot water from the boiler is led to the cylinders, the valve motion being reversed and the cylinder cocks open. The water vaporizes sufficiently in the cylinders to cause a certain amount of back pressure. Mr. Trevithick's device is somewhat more elaborate.—Eds. RAILROAD DIGEST.]

Statistics of Railways in the United States for Year Ending June 30, 1901

From summaries which will appear in the Thirteenth Statistical Report of the Interstate Commerce Commission the figures in the following advance statement is obtained.

EQUIPMENT.

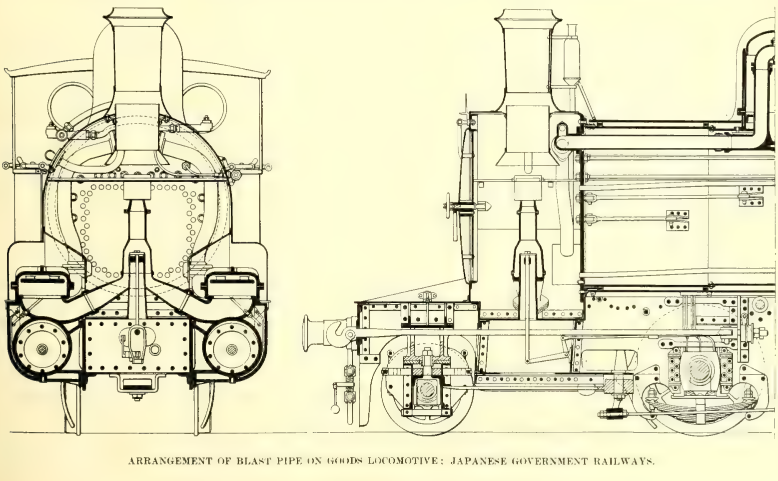
There were 37,663 locomotives in the service of the railways on June 30, 1900, or 960 more than the year previous. Of the total number reported, 9,863 are classed as passenger locomotives, 21,596 as freight locomotives, 5,621 as switching locomotives, and 583 are not classified.

The total number of cars of all classes in the service of the railways on the same date was 1,450,838, an increase of 74,922 being shown in this item. Of the total number, 34,713 are assigned to the passenger service, 1,365,531 to the freight service, and 50,594 to the direct service of the railways. It should be understood, however, that cars owned by private companies and firms and used by railways are not included in the returns made to the Commission.

It appears that the railways of the United States used on an average 20 locomotives and 753 cars per 100 miles of line; that 58,488 passengers were carried, and 1,626,179 passenger miles accomplished per passenger locomotive; and that 51,013 tons of freight were carried and 6,556,731 ton miles accomplished per freight locomotive.

Both locomotives and cars being embraced in the term equipment it appears that the total equipment of the railways on the date referred to was 1,488,501. Of this number 1,005,729 were fitted with train brakes, the increase in this item being 197,655, and 1,404,132 were fitted with automatic couplers, the increase being 266,413.

Practically all locomotives and cars in the passenger service were fitted with train brakes, and of 9,863 locomotives assigned to that service 7,431 were fitted with automatic couplers. Nearly all passenger cars were fitted with automatic couplers. With respect to freight equipment, it is noted that nearly all freight locomotives were equipped with train brakes and 75



ARRANGEMENT OF BLAST PIPE ON GOODS LOCOMOTIVE: JAPANESE GOVERNMENT RAILWAYS.

per cent of them with automatic couplers; the corresponding figure one year previous was 45 per cent. Of 1,365,531 cars in the freight service June 30, 1900, 920,465 were fitted with train brakes, and 1,307,559 with automatic couplers.

RAILWAY ACCIDENTS.

The total number of casualties to persons on account of railway accidents during the year ending June 30, 1900, was 58,185. The aggregate number of persons killed in consequence of railway accidents during the year was 7,865, and the number injured was 50,320. Of railway employees, 2,550 were killed and 39,643 injured. The casualties to employees resulting from coupling and uncoupling cars were: Number killed, 282; injured, 5,229. The corresponding figures for the preceding year were: Killed, 260; injured, 6,765.

The number of passengers killed during the year was 249, and the number injured 4,128. The corresponding figures for the previous year were 239 killed and 3,442 injured. In consequence of collisions and derailments 88 passengers were killed and 1,743 injured. The total number of persons, other than employees and passengers, killed was 5,066; injured, 6,549. These figures include casualties to persons classed as trespassers, of whom 4,346 were killed and 4,680 were injured. The total number of persons killed at highway crossings was 750, injured, 1,350.

The summaries giving the ratio of casualties show that 1 out of every 399 employees were killed, and 1 out of every 26 employees were injured. With reference to trainmen—including in this term enginemen, firemen, conductors, and other trainmen—it is shown that 1 was killed for every 137 employed, and 1 was injured for every 11 employed. One passenger was killed for every 2,316,648 carried, and 1 injured for every 139,740 carried. Ratios based upon the number of miles traveled, however, show that 64,413,684 passenger-miles were accomplished for each passenger killed, and 3,885,418 passenger-miles accomplished for each passenger carried. The corresponding figures in these latter ratios for the year ending June 30, 1899, were 61,051,580 and 4,239,200 passenger-miles for each passenger killed and each passenger injured, respectively.

One summary shows that in the course of thirteen years ending June 30, 1900, in consequence of railway accidents, 86,277 persons were killed and 469,027 persons were injured. The injuries reported varied from comparatively trivial injuries to those of a fatal character.

SUMMARY

	1901.	1899.	1898.
Miles of railroad completed....	193,346	189,295	186,396
Increase in 12 months........	4,051	2,899	1,968
Miles of track...............	4,051	2,899	1,968
Miles of road operated........	192,556	187,535	184,648
Number of corporations......	2,023	2,049	2,047
Number in hands of receivers..	52	71	94
Mileage in hands of receivers..	4,178	9,853	12,745
Locomotives	37,663	33,703	36,234
Cars, passenger..............	34,713	33,850	33,595
Cars, freight.................	1,365,531	1,295,510	1,248,826
Cars, total..................	1,450,838	1,375,916	1,326,174
Cars and eng. with p'w'r br'ks.	1,005,729	808,074	641,262
Do. with automatic couplers...	1,404,132	1,137,719	909,574
Employees	1,017,653	928,924	874,558
Employees per 100 miles of road	529	495	474
Dividends paid, millions	$139.6	$111.0	$96.2
Gross earn'gs, year, pass., mil'ns	323.7	291.1	267.0
Gross earng's, year, fr't., mil's.	1,049.3	913.7	876.7
Gr's ear'gs, yr, tl, inc, ms, m'l.	1,487.0	1,313.6	1,247.3
Average of same per mile......	7,722.0	7,005.0	6,755.0
Operating expenses, millions..	961.4	857.0	818.0
Net earnings, millions.........	525.6	456.6	429.4
Other income, millions	162.9	148.7	138.2
Net income, millions	688.5	605.3	567.6
Fixed charges, etc., millions....	461.2	441.2	427.2
Passengers carried millions....	576.9	523.2	501.1
Passengers, one mile, millions..	16,039.0	14,591.3	13,379.9
Freight carried, million tons...	1,101.7	959.7	879.0
Same, one mile...............	141,599.2	123,667.3	114,077.6
Avg. rate per ton mile (mills).	7.3	7.2	7.5
Avg. pass. fare per mile (cts.).	2.0	1.92	1.97
Employees killed	2,550	2,210	1,958
Employees injured...........	39,643	34,923	31,761
Passengers killed	249	239	221
Passengers injured	4,128	3,442	2,945
Other persons killed..........	5,066	4,674	4,680
Other persons injured........	6,549	62,55	6,176
Total killed	7,865	7,123	6,859
Total injured	50,320	44,620	40,882

The Metal in the Hub of a Car Wheel

A CORRECTION.

Mr. F. H. Stark, master car builder of the Cleveland, Lorain and Wheeling Railway, writes us as follows:

"In your July number you quote me as stating that hard iron must be put in the hub of car wheels to stand the pressure (see page 267). I said that in some cases the iron in the hub was not soft, or excessive pressure in mounting was followed by bursting of the hub in some instances where journal became heated.

"Please correct this, as I do not wish to be quoted as an advocate of hard iron in hub, when the reverse is the case."

Index to Proceedings of Master Mechanics' Association.

At the 1900 convention of the American Railway Master Mechanics' Association, the executive committee was instructed to prepare an index of the proceedings of the association from 1868 to 1900, inclusive. This has been done, and it is now ready for distribution. It contains 206 pages of indexed matter, and is bound similar to the present proceedings. The price of this volume is $1.00, plus postage, 9 cents, when sent by mail. Orders for any number will be filled by the secretary of the association, Mr. J. W. Taylor, 667 Rookery Building, Chicago.

Inspection of Safety Appliances

A circular has been issued by the secretary of the M. C. B. Association as follows:

At the last convention a copy of a set of rules for inspection of safety appliances, adopted April 1, 1901, by the Interstate Commerce Commission, was exhibited during one of the discussions; and, on motion, the secretary was instructed to arrange with the secretary of the Interstate Commerce Commission to furnish the members of this association with as many copies of this pamphlet as might be required. This has been done, and I am advised by the secretary of the Interstate Commerce Commission that the commission will furnish to the members as many copies as may be ordered, free of charge.

I enclose herewith copy of the pamphlet referred to, and if you will send your order to this office for such number as you may wish, will transmit it to the secretary of the Interstate Commerce Commission at Washington, with the request that the order be filled.

M. C. B. Rules

The secretary of the Master Car Builders' Association announces that the rules of interchange, as revised at Saratoga, N. Y., in June, which go into effect on September 1, 1901, are now ready for distribution, and will be furnished at the same rates as heretofore, viz.:

25 copies	....	$1.00
50 "	....	1.75
100 "	....	3.00

A less number than twenty copies, at five cents per copy. Postage will be added in all cases when sent by mail.

There will be no printing on the cover, except "Revised, 1901," unless otherwise ordered and specified, in which case the additional printing on the cover will be charged additional at cost.

The Standard Steel Platform

It may be observed that the advertisement of the Standard Coupler Company, which is printed on the back cover of the DIGEST, has been changed, so that the long standing announcement to the effect that "one hundred railroads now use the Standard steel platform" has been made to read 123 in place of 100. The significance of these figures as indicating the growing extensive use of this admirably designed attachment is such as to need no comment.

A Railroad Pensions Its Manager

For his long and efficient service as manager of the Pacific system of the Southern Pacific, J. A. Fillmore, who has just resigned, has been granted a pension of $500 a month for life.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Use of Beech Ties

Moniteur Industrielle, June 1, 1897, p. 87.

M. Schneidt, a former manager of German railways, has published the results of his observations on the use of beech ties. The creosoted beech ties laid on some lines in Alsace-Lorrain in 1868-1869 were found to be in a fine state of preservation in 1897. In fact, after nearly twenty years of service, about 86 per cent. were still in the track. Again, in the Elberfeld district, it has only been necessary to replace about 13 per cent. of the beechwood ties that were used. These were impregnated with a mixture of chloride of zinc and creosote.

A report was made in 1892 regarding the ties that had been replaced in the tracks of the Eastern Railway of France during the preceding twenty years. According to this report there was a necessity of replacing 52 per cent. of the oak ties that had not been impregnated; 26.8 per cent. of the creosoted oak ties, and 6.4 per cent. of the beech ties.

According to statistics published in 1898, there have been replaced, on the Eastern Railway, during a period of twenty-four years 67 per cent. of the non-impregnated ties, 46 per cent. of the creosoted oak ties, and only 12 per cent. of the creosoted beech ties.

Reports were made by fifty-four railways to the International Railway Congress in 1895, giving the average life of creosoted ties used first upon the main line and then upon sidings. From this it appeared that the average life of pine on the main line was fifteen years, and five years on sidings, or twenty years in all. Oak ties lasted eighteen years on the main line and seven years on sidings, or twenty-five in all. Beech ties lasted twenty years upon the main line and ten years upon sidings, or thirty years in all.

Taking the first cost and the life of these ties into consideration, the annual expense per tie was 5.2 cents for pine, 5 cents for oak, and 3.6 cents for beech.

It may be added that this long life of beechwood ties has only been obtained with the creosoted wood and not with unimpregnated material. This is explained by the fact that it will absorb much more of the creosote than oak. A well-dried beech tie will absorb from 44 to 55 pounds of creosote without pressure and from 66 to 77 pounds under pressure by which it is perfectly impregnated. In cases where such favorable results have not been obtained it is claimed either that the impregnation has been incomplete or the wood used had already begun to decay when the work was done.

Corrosion of Metal Structures

The Age of Steel, July 13, 1901, p. 14.

The use of metal for construction purposes has practically displaced the use of other material. The objective point now is strength, solidity and lasting quality. The average person believes that the use of iron and steel conveys the idea of indestructibility. In point of absolute fact this is not so. Iron and steel suffer from concussion, vibration, fatigue and general deterioration, and sometimes to the extent of rendering them unfit for the purpose intended. At the May meeting of the American Society of Mechanical Engineers, three examples were given of famous metal structures which showed the destructive effect of corrosion. The examples alluded to were the Firth of Forth bridge in Scotland, the Victoria tubular railway bridge over the St. Lawrence at Montreal, and the elevated railway system in New York City. Paint is used quite freely to prevent corrosion, that in the long run eats into the weight and strength of metal structures. The Firth of Forth bridge has been continually painted at regular intervals, and while it answers its purpose to a certain extent, corrosion is not to be denied. It has made serious inroads on that costly structure. Coatings of the best known paints in time become decomposed or detached from the surface by moisture, scale or grease beneath them. Some defects may be due to mechanical working—the iron or steel may be run out too hot and too quickly and then not properly cared for. The large sums of money invested in such structures demand that extraordinary vigilant attention should be paid to the best means of arresting decay. Time, of course, is an inevitable destroyer, but science can do much to prolong the life of iron and steel.

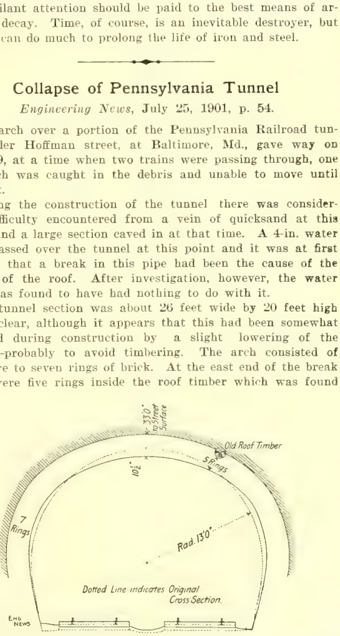
Collapse of Pennsylvania Tunnel

Engineering News, July 25, 1901, p. 54.

The arch over a portion of the Pennsylvania Railroad tunnel under Hoffman street, at Baltimore, Md., gave way on June 29, at a time when two trains were passing through, one of which was caught in the debris and unable to move until dug out.

During the construction of the tunnel there was considerable difficulty encountered from a vein of quicksand at this point, and a large section caved in at that time. A 4-in. water main passed over the tunnel at this point and it was at first thought that a break in this pipe had been the cause of the failure of the roof. After investigation, however, the water main was found to have had nothing to do with it.

The tunnel section was about 26 feet wide by 20 feet high in the clear, although it appears that this had been somewhat modified during construction by a slight lowering of the crown—probably to avoid timbering. The arch consisted of from five to seven rings of brick. At the east end of the break there were five rings inside the roof timber which was found



Cross-Section of Pennsylvania R. R. Tunnel at Baltimore, Md., at Point of Break.

to have been imbedded in some two or three rings of the arch, but as the latter sloped downward toward the west, it would indicate that not over three rings were left entire between the timber and the soffit. It was found that in the brickwork removed for repairs there was little or no cohesion between the mortar and many of the bricks, so that many of the bricks could be detached without the use of tools. The bonding appeared to have been insufficient, for in tearing out the arch east of the break a transverse joint was exposed without longitudinal toothing in the brickwork, the joints showing a deposit of smoke for five rings or more from the soffit.

American Bridges in India

Railroad Gazette, July 5, 1901, p. 485.

Sir Guilford Molesworth, consulting engineer for the State Railways of India, and who has been distinguished in the profession for more than a generation, has recently written the London *Standard* on the matter of American engineering contracts in India. He says in part: "With reference to the article on the indictment of the India railways for bad management and partiality to foreign engineering firms, by Sir Alfred Hickman, I shall feel obliged if you will bring before your readers the following extracts from letters I received from an engineer now engaged on the inspection of bridge work and railway material in the United States. The letters are dated May 6th and 16th respectively, 1901: "I had an idea before I came out this time that the Americans made good but rough bridge work, but this is quite a mistake. The work is as well finished as any English work, and quite as good as, if not better than, any turned out in England, both as regards workmanship, finish and material. I am speaking now of the ——— Company, as they are turning out a splendid job in every way. I have a good deal of testing, but luckily the steel is excellent, and there is no attempt to scamp in the shop. The drawing office methods are excellent, and the way the drawings are made out and tabulated is most workmanlike."

Again—"Live rollers are used very much, and ordinary rollers to every machine. Much fewer workmen are used, and they work much harder; they do not limit the output of a man as in England."

These remarks speak for themselves, coming as they do from an experienced engineer, who for several years managed a large bridge building establishment in England.

It is childish to raise the cry of partiality. The blame lies partly with those who do not follow up the lead of the United States in adopting labor-saving appliances; but chiefly with those who, for political reasons, connive at the insane policy of trades unions in limiting the output of the British workman.

American Railroads Following British Practice

Trade Journal's Review (London), July 15, 1901, p. 27.

Americans do not often admit any indebtedness to this effete old country for any of their engineering practice, and yet it is noticeable that they are adopting on their railroads more and more the British plan of carrying the ballast right across the smaller bridges. The plan, of course, considerably increases the load on the structure, but in the case of small spans this is beneficial, per se, and there are further advantages in maintaining continuity as much as possible in the character of the track. The plan in question is being adopted for all the street crossings involved in the heavy work of track elevation now in progress in Chicago. Some 227 miles of track are being dealt with on the Chicago & Alton and the Santa Fe and Illinois Central lines alone.

Chester Steel Tie

Railway and Locomotive Engineering, July 1901, p. 308.

In answer to enquiries made by *Locomotive Engineering* regarding the Chester metal tie, Mr. C. M. Gage, general manager of the Huntington & Broad Top Mountain Railroad, replied: "We put forty-four of these ties in our track in October 1899, and they remained there until October, 1900, carrying all the light and loaded traffic of the road without developing any deficiency in the bearing surface or other requisites of a steel tie. They were removed from the road lately on account of relaying the track with a heavier rail than that for which the tie was designed, but while in the track they were subject to the greatest amount of traffic that we could give them, carrying 150-ton engines and 100,000 pounds capacity cars; and, as far as our experience goes, we considered them a very good class of tie, but as lumber is very plentiful along our line, and will be for some years to come, we are not thinking of adopting them."

Yellow Glass for Fixed Signals

Railroad Gazette, July 5, 1901, p. 486.

The use of yellow glass for the lamps of fixed signals is steadily increasing. The latest installation is on the joint line of the Erie and the "Big Four," between Marion Junction and Gallion; and this example will be of particular interest because the yellow lights will be used under more trying conditions than they have been subjected to anywhere else. Doubt has been expressed on all sides whether a yellow which is dark enough to be quickly distinguished from street and house lights would not under adverse conditions, such as a foggy atmosphere, be likely to be mistaken for red, and thus lead to confusion. It has been claimed that an engineman who should often find it difficult to decide whether or not a light was red would become careless and would put all reds and yellows in the same class; and thus would sometimes run past a stop signal, taking it for a home signal.

Locomotive Equipment, Appliances and Related Matters

The Advantages of Liquid Fuel

Railway Engineer (London), July, 1901, p. 199.

Mr. James Holden contributed an interesting paper on "Liquid Fuel on the Great Eastern Railway," to the special railway issue of the "Engineering Times." In it he said: On the long runs of faster trains, which are yearly increasing in number, one of the chief difficulties is the fire, which being continuously urged for such long intervals becomes choked with dirt and ashes. With oil-burning locomotives no such trouble exists, as the supply of fuel is regular, continuous, and entirely free from residue. An engine of the Great Eastern Railway on a special occasion had to haul an express train from London to Scarborough and back. The total distance covered was 532 miles—the engine being in steam twenty-four hours. The fire was untouched during the whole time, and the engine steamed as freely during the last half hour of the run as on the initial fifty miles of the journey.

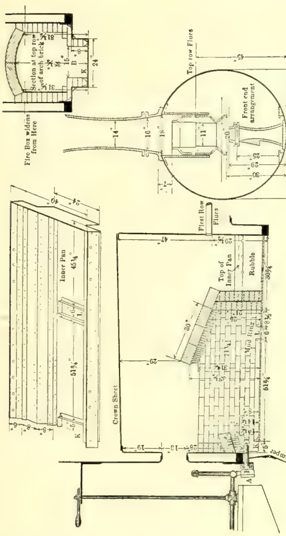
Oil Fuel in Locomotives

Railway and Locomotive Engineering, July, 1901, p. 300.

Mr. H. M. Honn, Trav. Fireman So. Pac., writes: These sketches were made from Engine No. 1450 which has been burning oil since the 20th day of last November. This engine has been pulling the owl train ever since her equipment, between Kern City and Mendota, Cal., a distance of 144 miles, which she doubles every day. She has never lost a minute's time on the road, on account of oil fuel.

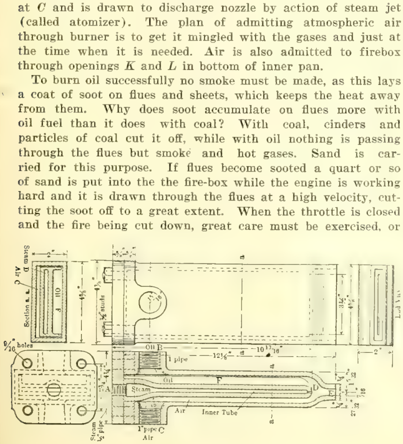
In equipping an engine for oil fuel, the grates are removed and an inner pan is substituted. It is bolted to side sheets at about same place as grates were, and extends 6 to 8 inches below foundation ring or position of the burner. This pan supports side walls and arches, and is covered with fire-brick except at air inlets, *L.* and *K.* (Fig. 1.)

The box is walled up all around to about the height of the arch. The arrangement of walls and arches gives almost an entire box of fire-brick, this eventually gets to a white heat, very little change is made in the front end, no netting being used. The supply of oil is carried in tanks placed in the coal-pit. They carry from 1,500 to 2,000 gallons of oil, and are kept warm by steam heaters from the boiler. The oil is con-



veyed to valve H by pipe and hose similar to those used for injectors except they are about 1 1-4 inches diameter. Valve H is an ordinary stop-cock and controls the admission of oil to burner and firebox. Atmospheric air is admitted to oil pipe at I, and passes through burner with the oil, which enters burner at B, Fig. 2, and runs along through F to point D. Here it meets a steam jet which was admitted to the burner at A and passes through burner just under oil trough to point D, where it catches the oil and discharges it into the firebox through nozzle E. Atmospheric air is also admitted to burner at C and is drawn to discharge nozzle by action of steam jet (called atomizer). The plan of admitting atmospheric air through burner is to get it mingled with the gases and just at the time when it is needed. Air is also admitted to firebox through openings K and L in bottom of inner pan.

To burn oil successfully no smoke must be made, as this lays a coat of soot on flues and sheets, which keeps the heat away from them. Why does soot accumulate on flues more with oil fuel than it does with coal? With coal, cinders and particles of coal cut it off, while with oil nothing is passing through the flues but smoke and hot gases. Sand is carried for this purpose. If flues become sooted a quart or so of sand is put into the the fire-box while the engine is working hard and it is drawn through the flues at a high velocity, cutting the soot off to a great extent. When the throttle is closed and the fire being cut down, great care must be exercised, or



fire will be put entirely out and this is what makes oil fuel so hard on fire-boxes. Burning oil in locomotives is in its infancy, and there is room for a great deal of improvement, but considering the length of time we have been at it, it certainly is remarkable to see how those engines go up the hill with their heavy trains, with plenty of steam and no smoke, no dust, no cinders and no sweating fireman.

Economy in the Use of Oil Fuel

Common Carrier, July, 1901, p. 12.

General Manager L. J. Polk of the Gulf, Colorado & Santa Fe, says that his company is equipping a number of engines to use oil instead of coal as fuel. His system uses from 750 to 1,000 tons of coal per day. The coal costs \$3.00 per ton. Col. Polk thinks the he will be able to buy oil at twenty cents a barrel and that four barrels will make as much steam as one ton of coal. That makes eighty cents for oil as against \$3.00 for coal, a saving of \$2,200 a day

Locomotive Fuel Economy

Railway and Engineering Review, July 13, 1901, p. 482.

There is great room for economy in the use of fuel in locomotives. Before really valuable results can be obtained, the education of engineers and firemen must be undertaken on a more thorough plan. Good, careful firing can only be obtained by "keeping everlastingly at it." What seems to be needed, is, the doing away with the present irresponsible system, and adopting one like the contract system of lubrication. When the latter first came into vogue, all sorts of arguments were used against it; but they all came to naught in the face of its success. So it may be with the contract system as applied to fuel. It might be successful, and there are good reasons for supposing it would be so. At any rate it would not be worse than the prevailing lack of system.

English Three-Cylinder Compound

Engineering, July 5, 1901, p. 13.

The type of locomotive illustrated by *Engineering* is that of a three-cylinder compound express passenger engine introduced on the North Eastern Railway by Mr. William Wordsell, locomotive superintendent of the line. The details of the engine include a number of special features patented by Mr. W. M. Smith of Newcastle-on-Tyne. The engine has a greater range of power than most locomotives now in service. It will, it is claimed, work with equally good results, a light train, a heavy train, a stopping train, or a fast long distance train. The engine is arranged so that it can be worked as a simple engine,as a semi-compound or as a compound engine. There are two low-pressure cylinders, outside, 20 in. in diameter, and one centrally placed 19 in. high-pressure cylinder, the stroke of the low-pressure cylinders is 24 in. while that of the high-pressure is 26 in. The two low-pressure cranks are placed at right angles, and the high-pressure cylinder crank makes an angle of 135 degrees with the other two, this has been found to be the most suitable position, the blast on the fire being regular. The driving wheels are four coupled 7 ft. 1 in. in diameter, the weight on the drivers being 35.5 tons; total weight of engine in working order is 53 tons, with tender 94 tons; total heating service, 1,324 sq. ft. From August 28 to December 31, 1898, inclusive, engine No. 1619 ran 20,930 miles and gained on booked time 1,172 minutes. Among the special features there are a series of water tubes (three sets, seven to a set) across the upper portion of the fire-box; ready access to them is obtained for purposes of cleaning and inspection through suitable doors in the external fire-box. The tubes are bent to a long spiral so as to give a certain amount of longitudinal elasticity, and thus reduce the strains arising from their expansion when hot. These tubes increase the heating surface in the fire-box by nearly 30 per cent. The engine illustrated has done excellent work on the East Coast line, between Newcastle and Edinburg.

Express Locomotive, South-Eastern and Chatham Railway

The Engineer (London), July 19, 1901, p. 71.

The new locomotives recently constructed from the designs of Mr. Harry S. Wainwright, locomotive engineer of the joint-lines, are doing excellent work over heavy roads, with the boat trains, usually equal to about twenty-two vehicles, and weighing behind the tender 260 tons, and easily keeping time. The incline of 12 miles out of London has been surmounted with 200 tons behind the tender at 40 miles an hour, which is excellent work. It will be seen, among other things, that steam reversing gear is employed, resembling that which has been used for sometime by Mr. Drummond on the South-Western Railway. The late Mr. Stroudley was, we believe, the first to use power for controlling the link motion. He employed compressed air from the brake reservoir. The advantages of working by steam or by compressed air are obvious.

Mr. Wainwright has produced a very fine engine, which will no doubt do much to promote punctuality in the working of the traffic.

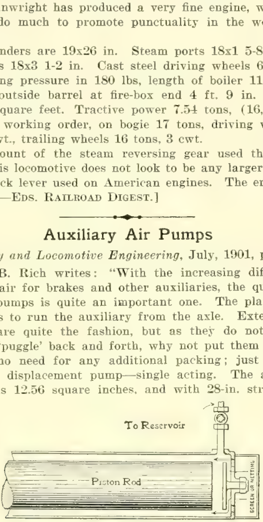
The cylinders are 19x26 in. Steam ports 18x1 5-8 in. Exhaust ports 18x3 1-2 in. Cast steel driving wheels 6 ft. 8 in. The working pressure in 180 lbs, length of boiler 11 ft. 1 in. Diameter outside barrel at fire-box end 4 ft. 9 in. Area of grate 20 square feet. Tractive power 7.54 tons, (16,849 lbs.) Weight in working order, on bogie 17 tons, driving wheels 16 tons, 17 cwt., trailing wheels 16 tons, 3 cwt.

[On account of the steam reversing gear used the reverse lever of this locomotive does not look to be any larger than the cylinder cock lever used on American engines. The engine is a 4-4-0 type.—EDS. RAILROAD DIGEST.]

Auxiliary Air Pumps

Railway and Locomotive Engineering, July, 1901, p. 315.

Mr. I. B. Rich writes: "With the increasing difficulty of supplying air for brakes and other auxiliaries, the question of auxiliary pumps is quite an important one. The plan usually proposed is to run the auxiliary from the axle. Extended piston rods are quite the fashion, but as they do not do anything but 'puggle' back and forth, why not put them to work? There is no need for any additional packing; just let them work as a displacement pump—single acting. The area of a 4-in. rod is 12.56 square inches, and with 28-in. stroke gives



PROPOSED AUXILIARY AIR PUMP.

351.68 cubic inches for each piston rod every revolution of the engine. A 60-in. wheel makes 366 per mile; or at 15 miles an hour, 84 revs. per minute. This gives 285.41 cubic inches or 17 cubic feet per minute from each rod—34 cubic feet from both rods. This is a pretty fair quantity, and can be depended on fairly well, and there is nothing to get out of order, and only one valve to seat besides check valve. Of course this amount would increase with speed and decrease with smaller rods or shorter stroke. If desired a by-pass could be used or the inlet valve held open, so as to let the rod run free."

Welding Cracked Locomotive Frames

Engineering News, July 18, 1901, p. 33.

Welding cracked locomotive frames in place is a feat which is being performed at the West Oakland shops of the Southern Pacific Railway. A small furnace of fire brick is built around the frame at the crack and an oil burner is then introduced and operated until the frame is brought to a welding heat. At the June meeting of the Pacific Coast Railway Club, Mr. Kellogg, the foreman of these shops, stated that an engine was recently brought in off the road at 8.30 A. M., with the main frame broken under the rocker box. In 22 hours the engine was back on the road hauling its train.

Efficiency of the Vanderbilt Boiler

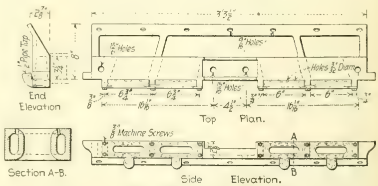
Cassier's Magazine, July, 1901, p. 260.

It may be interesting to recall that what has been brought out within the past year under the name of the Vanderbilt locomotive boiler—a corrugated furnace design by Mr. Cornelius Vanderbilt, has had various forerunners, the best known of which probably was the double-furnace boiler of Mr. George S. Strong of sixteen or seventeen years ago. None of these earlier designs, however, seem to have given the same measure of promise as the Vanderbilt engine. Recent tests of the latter on the New York Central Railroad, made under the direction of Mr. S. M. Vauclain, superintendent of the Baldwin Locomotive Works, of Philadelphia, in comparison with a sister engine exactly similar in every respect with the exception of the size and shape of the fire-box, showed an economy in fuel reaching practically 10 per cent. Internal examination of one of these boilers developed the fact that no scale of any account had accumulated on the crown sheet or on the side sheets, whereas on the crown sheets of the other locomotives a very thick scale had formed; sediment had settled and had not been washed off. The fire-box of the ordinary engine was but 42 inches wide, and was full length, 10 feet, in round figures, whereas in the fire-box of the Vanderbilt boiler the grate was about 54 inches wide. With so wide a grate there was no need of great length. The fire-doors were rather high, so that a man had no difficulty in looking at his fire and seeing that the fuel was properly distributed. A portion of the economy, therefore, Mr. Vauclain attributed to the absence of scale in the fire-box and to the fact that the grate surface was nearer square, enabling the man to distribute his fuel to better advantage, and also preventing the fireman from carrying too heavy a fire, whereas in the other engines he can carry the fire as he pleases. Where it is possible to carry a light fire and have a free circulation of air through the grates, getting the proper amount admitted, and admitted at the right time and in the right place, the combustion is, of course, far superior to what it is with a fire-box choked with a fuel layer too deep and too thick and improperly distributed.

Wide Fire Box Locomotive for Anthracite Culm on D., L. & W. R'd.

Engineering News, July 25, 1901, p. 62.

The nine passenger locomotives now being built for the D. L. & W. R.R by the Schenectady locomotive works are chiefly notable for the great width of the firebox employed and for the combination air and steam jet apparatus used for blowing away the ashes from the sides of the ash pan. The fuel used being a very poor grade of anthracite culm, special provision



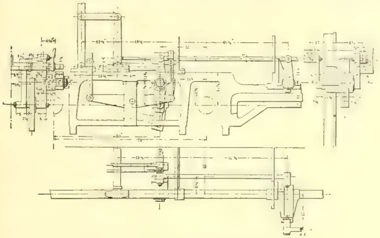
DETAILS OF ASH EJECTOR, PASSENGER LOCOMOTIVE, D., L. & W. R. R.

is required for its successful combustion; and the arrangement used is the outgrowth of the experience of Mr. T. S. Lloyd, Supt M. P. of the D., L. & W. Mr. Lloyd states that the arrangement has been found to work very satisfactorily. By examining the view here given it will be seen that the steam jet blowers are located on the grate line, just above the rear drivers. The engine has 20x26 in. cylinders, 5 ft. 9 in. driving wheels, weighs 139,000 lbs., of which 93,000 lbs are on the drivers, and is a 4-4-0 type.

Valve Motion Transmission Bar

American Engineer and Railroad Journal, July, 1901, p. 218

Through the courtesy of Mr. F. F. Gaines, mechanical engineer of the Lehigh Valley Railroad, a drawing has been received of an attractive and simple arrangement of the valve motion transmission bar whereby the usual curved bar or back-connection motion is avoided. The various methods of dodging the forward axle of Atlantic, 10-wheel or consolidation engines, have been illustrated in the American Engineer at different times. In the Lehigh Valley plan the link block drives the lower of a pair of rocker arms which are journaled on a pin which is secured in a boss forged on the frame. A straight



Simple Arrangement of Valve Motion Transmission Bar.

rod connects the upper of these arms, over the forward axle to another pair of rockers, which, in this case, are both above the center of the rocker box. These may be like the arms at the links, both in the same plane if necessary, this arrangement being the one used in the 10-wheel engines illustrated on page 312 of our issue of October, 1900. The present engraving shows how conveniently the equalizer may be arranged without the slightest interference with the valve gear and also how the rocker shaft to take the motion outside of the frames may be moved ahead of the driving wheels, where it also will be out of the way.

This general plan has been adapted to a number of different classes of engines on the Lehigh Valley, including those hauling the "Black Diamond Express." It has also been adopted for two new classes of engines now being built by the Baldwin Locomotive Works for the Long Island Railroad.

British and American Locomotives

Railway and Locomotive Engineering, July, 1901, p. 304.

The general finish of American engines is inferior to that of British engines, for the reason that in this country it is not thought necessary to bestow much time and labor upon what is not essential to the good working of the machines; the finish and fitting of the working parts, however, is quite equal to that of the British.

The charge that American engines burn more fuel to do a given amount of work than those built in the United Kingdom, the editor of *Locomotive Engineering* thinks is well founded. He says American designers arrange the proportions of locomotives so that they will exert the greatest possible power at the start. They are made as if the intention was that they should be starting very heavy trains all the time. Large cylinder power is useful in starting or for pulling on a steep grade, but at other times the big cylinder is wasteful of steam. Good arguments can be used to show that, after a train has attained the desired speed, if one cylinder could be cut off altogether it would be an economical thing to do.

European locomotive designers give their engines the cylinder power necessary for doing the full work, which the boiler can provide steam for, when necessary. They use small steam passages and small admission ports, so that cylinder clearance wastes as little steam as possible, and the cylinders have small relative capacity when the engine is working light. There is good reason to believe that the large steam port and long valve travel common to American locomotives are wasteful of steam. American designers and builders are so joined to their idols that *Locomotive Engineering* does not expect to be able to show them the error of their ways. They seem to follow stationary steam engine practice slavishly and to forget that a locomotive has to endure extreme conditions of wind and weather which no other form of steam engine has to face. "We feel certain that so long as they pursue the steam-wasting practices brought about by current fashions in design, so long will foreign locomotive builders be able to show that the American locomotive is an extravagant form of steam engine.

There is nothing in the contention that British engines can be run on less oil than American engines require.

English and American Engines

The Engineer (London), July 5, 1901, p. 19.

A correspondent of *The Engineer* says that it is amusing to find that the arguments put forth by Mr. Rous-Marten in defence of the American Midland engines are expressly repudiated on this side of the Atlantic. He quotes the *Scientific American* as follows: "We fail to understand how such a difference in repairs and oil could occur; and one is forced to the conclusion that the English engines must, as far as the engineers and firemen are concerned, have received more careful handling than the foreign-made locomotives. Possibly, also, the American locomotive may have suffered from the fact that it is built for harder service than its English competitor, and that it was hauling loads much below its maximum capacity. The American boiler is built to be forced, and the exhaust is harsher with a view to a fiercer draught. The exhaust is softer in the English locomotive, and the boiler is not usually forced as it is in the American locomotive. It can readily be understood that if the American locomotives were not being worked up to their full capacity, they would show less fuel economy per load hauled than engines which were designed and built for the conditions of the test." The truth seems to be that, as compared with the English engines, those built in the United States are not good. Americans, he goes on to say, are at their best when turning out cheap machinery, very good, indeed, of its kind, but that kind, not according to English ideas, the best.

The Real Difference

The Engineer (London), July 12, 1901, p. 38.

In the mass of correspondents writing to the papers, each eager to solve the vexed question as to the relative merits of British and American locomotives, one from University College, London, is interesting. The writer says: "None of your correspondents have mentioned one very important disadvantage under which American engines are laboring, namely, that they are not supplied with American air!"

[Another correspondent, signing himself "Fair Play," suggests that water should have been brought over from America for the trials. The water idea is not bad, even if the water itself is; in fact there might be *something in the water* theory. —Eds. Railroad Digest.]

British vs. American Locomotives

Fielden's Magazine (London), July, 1901, p. 6.

Feilden's Magazine says that speedy delivery and apparent cheapness in price are the only features that can justify, under exceptional conditions, the purchase of American locomotives by countries that produce a better article. This cheapness, it says, is due only to the entirely abnormal conditions prevailing in the United States, which permit American manufacturers to overcharge the home consumers and to dump upon foreign markets, if necessary, even below cost price, their surplus stock. It admits that England can never again monopolize the iron and steel trade of the world, but says that no other nation can do so, as this age is no longer suited for an industrial hegemony. "Our American friends," it says, "although deservedly enjoying a high reputation for ingenuity and energy,

have so far failed to establish a name for reliability and carefulness, and as long as they continue to send all over the world articles that, though at a first glance are attractive in appearance, will not bear close inspection, they can hardly hope to secure permanent success, even by selling cheaper than the lowest prices possible. In the United States scarcely anything is built or constructed to last, and everything, from a garden fence to a railway track, bears the impress of being a makeshift, good enough to last until something better turns up." The article winds up by calling on the technical and daily press to use all their influence to secure British manufacturers all orders that they are able to execute.

American and English Locomotives

The Engineer (London), July 12, 1901, p. 38.

Mr. F. W. Brewer writes: Supposing that the American engines had been bigger, and the Midland engines had been bigger than they are, is the conclusion at all justifiable that these larger Midland engines would have shown no superiority over the Yankees simply because the latter were such as American builders would design for loads of 500 tons British? I can scarcely think so. Some explanations of the greater fuel consumption of the Midland Moguls might be found in the heaviness of the reciprocating parts, such as the crosshead, nonfluted coupling rods, and heavy cast iron pistons. American outside cylinders are hardly conducive to economy of fuel, whatever may be their advantages as regards accessibility for repairs, inasmuch as the steam supply passage is partly exposed to the air, and is partly in contact with the exhaust passage, the latter thus robbing the former of some of its heat. Again, the small diameter of the blast nozzle—3 3-4 inches—he thinks, would no doubt partly account for the extra coal consumption as compared with the Midland road's engines, while it is to be noted that the counter-balancing in the Baldwin engines on the Midland seemingly differs from that of the Baldwin Moguls on the Great Northern. It is, therefore, not impossible that the American engines may have greater internal friction than the Midland Company's British-built goods engine, and this greater friction, while it would not militate against their haulage capacity, might yet have a marked influence on the expenditure for coal, oil, and repairs. The writer says he does not offer these observations in disparagement of the American locomotive properly so-called. In the United States it is unquestionably a survival of the fittest, but the methods of operating American railroads are so vastly different from our own, and as little or no attention is paid, in the States, to fuel consumption, and as the boilers of the engines are always more or less forced, it follows that an American locomotive is not necessarily and wholly adapted to British railway working. It must be modified accordingly if it is to be an unqualified success, just as the British locomotive for abroad must be modified to suit conditions not obtaining in the home country.

English Engines Unsatisfactory

A press despatch from Kingston, Jamaica says: Two engineers representing an English firm of locomotive builders are due to arrive here, for the purpose of inquiring into the failure of English locomotives to perform the same work as American railroad engines. The Jamaican Government railroad engines are still unsatisfactory, and the visit of the engineers is the result of a government protest on the subject.

Our Engines Abroad

Common Carrier, July, 1901, p. 27.

The assistant chief engineer of the Orleans Railway in France, according to a recent cable despatch, says that the result of his railroad's purchasing thirty American locomotives is not encouraging. They were ordered "because they were needed in a hurry." They burned more coal and cost more to repair than other locomotives doing the same work. His company will henceforth stick to French locomotives as they are equally satisfactory and more economical. Ex-Manager Elliott, of the Cape Colony railways, is reported as praising the Baldwin locomotives for their excellent material and the prompt delivery made, but adds that they consume 20 per cent. more fuel than the English engines.

The most specific charge comes from Mr. Samuel W. Johnson, superintendent of the locomotive department of the Midland Railway of England. Two years ago that road purchased forty American locomotives. After six months' test Mr. Johnson says that they cost from 20 to 25 per cent. more than the British in fuel, 50 per cent. more in oil and 60 per cent. more in repairs. He admits that they worked satisfactorily, but their inferiority in the above three points is incontestable. These American locomotives cost $2,000 apiece less than the British and were delivered far more quickly, and a Pittsburg paper remarks that $2,000 will pay for a good deal of coal and oil. Major Johnstone, reports from Egypt that the American locomotives there, use ten per cent. more coal than the other types. On the other hand, the American locomotive builders allege that their engines do not receive proper trials and care from the British engine drivers, and they remark that the best criterion of the superiority of the American locomotive is the fact that it is running without any complaints almost all over the earth, and that foreign orders for American engines are still coming in.

American Locomotives in France

Railway Age, July 26, 1901, p. 58.

Mr. T. H. Symington quotes the London *Daily Mail* as saying that another engineer of high standing on the Paris-Orleans Railway has given his impressions of American engines. They looked well when received, and ran for a few days and then the following defects developed: (1) Firebox stays very defective, and allowed framing to become loose. (2) Tubes very bad, leakage very great. (3) Cylinders scored, not properly fitted, oil did not lubricate whole circumference of piston rod ends. (4) Steam chambers and steam passages left rough. (5) Axle boxes ran hot; ordinary waste used instead of properly made wicks.

Mr. Symington says this is the first detailed criticism that has, to his knowledge, come to this country. The firebox stays referred to are probably the expansion pads between boiler and frames. These became loose. Possibly in the setting up of engines in France the expansion pad bolts were not tightened down. With reference to the tubes, Mr. Symington says if they leaked a very little attention would have corrected the trouble. As to the scoring of the cylinders, such scoring, after only two days' service, would indicate that the cylinders, etc., had not been properly blown out, or that a little extra valve oil, during the breaking-in process, had not been allowed. Regarding the fourth count in the indictment, it would look as if French engineers were in the habit of having cored passages filed out. Mr. Symington does not think that is the practice in France or in any other country. The trouble was no doubt caused by some loose sand in the passages, which should have been removed by blowing out. In reference to the fifth item of criticism, Mr. Symington admits that continental engineers take greater pains, and use more expensive appliances than we do to prevent hot driving boxes, and they succeed exceedingly well, but he points out, that in this country, greater attention is being paid to this important matter. He also says that American engines are as well finished as any others, as far as the essential parts are concerned, and that our engines make 100,000 miles after coming from the builders' hands before shopping, and they are maintained on a great many roads at from 3 to 5 cents per mile year in and year out.

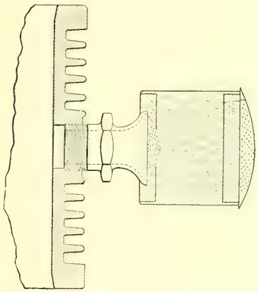
[There is nothing in this indictment of the American engine in France which is very terrible, or anytning worse than any buyer in this country would say to a builder after receiving new engines, though the latter might not object to just the same things or in just the same way. It appears to us that Mr. Symington has explained what was meant by the French authorities and that he has very successfully met the objections raised. These few faults, thus stated, do not form any basis for comparison of French or American engines. The only way to compare engines made there and here is for American engi-

neers, fully knowing the conditions of service, to design with a perfectly free hand for the French railway as it is, and then, after "breaking in" to have ten or twenty engines run in competition with an equal number of French ones, for their full ante-shop mileage, if we may so call it.—Eds. Railroad Digest.]

Strainer for Air Pump

Railway and Locomotive Engineering, July, 1901, p. 316.

Mr. I. F. Wallace writes: "I have seen several articles coming from men running engines on the desert sections of the West and Southwest, complaining about their air pumps giving trouble from air cylinder overheating, caused by sand and dust having been sucked with the air into the cylinder. The illustration of air strainer for pump explains a simple device which obviates all this trouble. It will be seen that there is a casing



of Russia iron soldered to the air strainer proper. This casing is filled with curled oiled hair. A perforated cap is made to slip inside the casing to keep the hair in place. When air passes through, the oiled hair catches all the dust and dirt, and it goes into the cylinder perfectly clean. When the hair gets full of dirt, take it out and wash it in coal oil, then re-oil with a little valve oil, and use it again. This device has been in use here (Minneapolis, Minn.) for two years and it works like a charm. Any tinsmith can make one and put it on in twenty minutes."

Cleveland Prism Glass

Iron and Steel, July 6, 1901, p. 9.

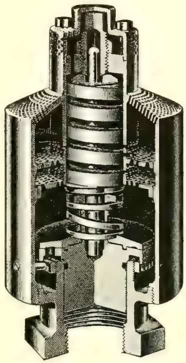
The Cleveland Window Glass Company, Cleveland, Ohio, manufacture the Cleveland prism glass for lighting up interiors with natural light, by means of prisms so arranged that beams of sunlight are bent and carried into otherwise comparatively dark rooms, on a plane with the floor and ceiling, more particularly street floors, cellars and kindred places, although they are also used much higher up. The glass prisms are made in 4-inch squares, which are set in either zinc or copper framework, according to the cost, the size of which depends on the dimensions of the sash to be covered. They can be furnished for sash or in a separate frame to go outside the sash. Applied to old work the frames are secured to the outside of the window, usually covering the upper half of it, the lower portion remaining plain glass to see through. The framework of prisms is sometimes vertical and often at an angle with the elevation of the building, according to the requirements of the situation.

[In the discussion on an "up-to-date" round house at the Master Mechanics' convention, Prof. W. Hibbard, of Sibley College, Cornell University, spoke of the possible advantage of using ribbed glass whose prismatic property diffused light, for windows, transoms or skylights in round house buildings. There is hardly a doubt that the use of such glass would improve the light in many of these buildings.—Eds. Railroad Digest.]

A Self-Adjusting Pop Valve

Railway and Engineering Review, July 6, 1901, p. 472.

The Crane Company of Chicago has a locomotive muffler pop valve on the market. The claim made for this valve is that it is absolutely self-adjusting. Several important railways have used it with satisfactory results. The self-adjusting is accomplished by means of an auxiliary spring and plate which regu-



SELF-ADJUSTING POP VALVE.

late the waste with the smallest lift. They are all adjusted to reseat with a loss of three pounds, or less if required, no matter at what pressure the valve may have been set. It is not necessary to change the auxiliary when the tension of the main spring is altered. Each valve is tested to 1,000 pounds hydraulic pressure before being adjusted, showing that the factor of safety is large. These valves are very simple in construction, prompt and accurate in operation, and reliable.

Car Equipment, Appliances and Related Matters

Eyes and Ears of Car Inspectors

Railroad Gazette, July 19, 1901, p. 511.

At the M. C. B. convention, topic No. 6, regarding the eyesight and hearing of car inspectors, proved to be a most suggestive discussion. Mr. Rhodes pointed out the advisability of examining the vision of master mechanics, master car builders, etc., before appointment to see if they are capable of detecting when things are properly or improperly done. It is no longer wise to suppose that all men with two eyes have normal vision. The importance of periodically examining the eyes of engineers and car inspectors was also dwelt upon, and examples of men occupying the position of car inspectors were given, and it was shown that some of them had only one-fifth normal vision. This was largely the fault of the appointing authorities; it also accounted for many of those "unaccountable" accidents. Mr. Rhodes concluded his interesting remarks by saying that it is not well to encourage the promotion of inspectors who are over 50 or 60 years of age. Mr. Symons emphasized the remarks of Mr. Rhodes, and told of a car inspector whose hearing was so imperfect that he was unable to detect leaking gaskets in air brakes. After the discussion, it was decided to appoint a committee to formulate a code for the examination of inspectors.

Ventilation of Box Cars

Proceedings, Central Railway Club, May, 1901, p. 20.

At the May meeting of the Central Railway Club, the advisability of providing ventilation in all box cars, was discussed by Mr. H. H. Perkins, as follows: We do not have any trouble about the ventilation of box cars containing grains, but with fruit we do; the latter all goes in refrigerator cars now, which are either ventilated by leaving the ice doors open, or are practically ventilated by closing them and putting ice underneath and keeping the temperature down. Ventilated cars are very good for plums, cherries and strawberries. The New York Central has quite a number of these cars in which the doors are racked and so the cars get good ventilation. This winter we had two refrigerator cars arrive here in Buffalo from Florida with oranges, and the heat in the cars, when they arrived, was over 120 degrees and the oranges were nearly baked, while the thermometer in Buffalo was below zero. My explanation is, that in Florida at the time the oranges were loaded, it must have been a very hot day; the doors of the car were open so that the car became heated to that temperature; then the oranges were placed in it and the doors tightly shut. Thus the car was practically an oven, and most of the oranges were ruined. In future, when we are drawing fruit from a southern climate to a northern one, in the winter, the ventilation will have to be regulated so as to let the cool air in down in Florida and shut the cold air out up here in Buffalo. Some refrigerator cars came from Baltimore, containing bananas, with ice doors open, when they began the journey. Someone closed the ice doors en route. When they got here the bananas were baked. The thermometer stood at 148 degrees in those cars. We are settling the claim now.

Uniform Matching of Car Stock

American Lumberman, July 6, 1901, p. 15.

The *American Lumberman* says that the wishes of the lumberman might well be consulted in the settlement of a uniform standard of dressing and matching, and, as regards the agreement as to the proper cross section, it should be followed absolutely and universally. It is pointed out that the present nostandard leads to much inconvenience and some loss to the railroads. Cars are constantly in need of repairs, and perhaps a brand new car may have its roof or side damaged, and the chances are against the material on hand being an exact match with that on the car. This repairing is done at a decided inconvenience and increased expense in the shop, with no gain to the lumber dealer. Standard goods should be made on standard dimensions, and the advantage of any manufacturer should rest on quality of material and workmanship rather than on any specialty in the location of tongue or groove.

If the M. C .B. Association would take up this subject and decide on standards for lumber used in car construction the lumberman who did not conform thereto would soon find himself in this respect out of business. A universal standard should be made, and the same universality should apply to floorings, ceilings and other forms of lumber which go into building construction.

The Future of the M. C. B. Association

American Engineer and Railroad Journal, July, 1901, p. 207.

This article contributed by Mr. S. P. Bush, formerly superintendent of motive power C. M. & St. P. Railway, was intended for publication before the M. C. B. Association convention took place. Mr. Bush says that up to the present time the rules of interchange have been the basis of its existence and its principal work. The greatest compliment upon its work lies in the fact that everything that has been done by it has been accepted by railroads without question. For the past two or three years the rules have required little or no modification, and the annual conventions have little to show for the time and money expended in their support. The reports of committees have not been very satisfactory as a whole, and have attracted little or no attention. Railroads will not permit their representatives to attend conventions and do nothing. Standards have been adopted to some extent, but these have been few, and in many cases recommended practices have been adopted instead, on the ground that standards were not practicable. It may be said that it is impossible to standardize many parts of a car, and that few would use the standards. In answer it may be said that it is vastly more important that cars should be kept moving in useful service than they should be held at interchange points awaiting material exactly like the original. Why cannot the association do in many cases as it did with the coupler question, in which it adopted certain principles and enough in the way of specific detail to promote interchangeability? Why should not the association begin with the wheel, and say fairly and squarely, without hesitation what it considers best. It not only can, but it should say, and give satisfactory reasons for saying whether a truck should or should not have lateral motion, whether or not bolsters should carry all the load on the center plates, whether the friction principle for draw gear is correct or not. These are a few of the many questions which the association can act on. The rules can be made to say that when A has B's car with broken drawgear, the former may apply what the association says is satisfactory, and B must receive the car. The M. C. B. Association, instead of standing passively by and permitting those inexperienced in car construction to direct, should itself take the initiative and say what shall be done. On the eve of important developments, such as steel construction and high capacity cars it might with entire propriety take hold of the reins and guide public opinion.

Sanitary Car Cleaning in France

Toronto World (Toronto), July 13, 1901, p. 6.

The French people have up-to-date ideas on the sanitation of railway cars. In France the law compels railway companies to observe all necessary sanitary precautions for the health and comfort of passengers. In virtue of legislation passed March 1 of this year, it is forbidden absolutely to sweep and dust car compartments while dry. The floors must be sprinkled and the seats and woodwork must be wiped with cloths moistened with some antiseptic solution. Dry sweeping and dusting only serve to scatter disease germs and particularly the bacillus of tuberculosis.

Arrangements must be made for the complete periodical disinfection of cars and for the daily cleaning of the compartments. In order to carry out this purpose the floors should be waterproofed or covered with carpets of India rubber, linoleum or something of the kind. The sides should be in wood. lincrusta or pegamoid. The cushions should be upholstered with some material not having a long pile, and preferably with a non-permeable material. Similarly in waiting-rooms and around station buildings, dry sweeping is forbidden, and those places that may be carpeted should be covered with something that can be washed.

Placards must be conspicuously displayed everywhere forbidding people to spit on the floors.

The linen of sleeping cars must be properly washed and subjected to high temperature in the process of cleaning after each journey, and to it should be attached a ticket indicating to the passenger the date of the last cleaning.

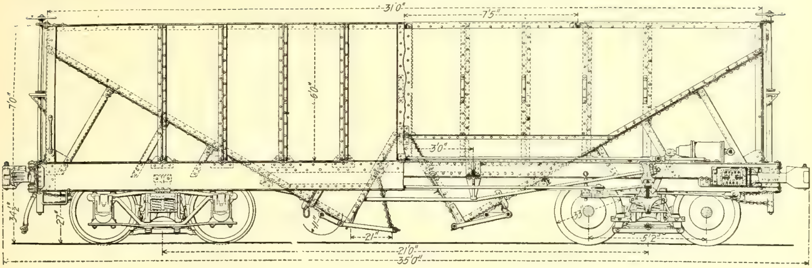
The managing officers of the various French railways are requested to make known to the Minister of Public Works what they are doing to carry out these orders, and in the meantime they must adopt the following measures:

Remove all carpets other than linoleum, India rubber or like substances.

Forbid, absolutely, dry sweeping and dusting in cars, waiting rooms, baggage rooms, halls, etc.

While waiting for opportunity to replace all upholstered coverings with material that may be washed the backs and seats should be protected by movable coverings which can be washed and subjected to high temperature.

Finally, it is forbidden to carry persons visibly or notoriously affected by contagious diseases in compartments that are used by the public.



Steel Hopper Car

American Engineer and Railroad Journal, July, 1901, p. 213.

The specially interesting features of this design are the light weight of the car and the method of construction in which the center sills are made of light sections, reinforced by truss rods. The car is designed to carry a load of 110,000 pounds with a capacity of 1,825 cubic feet when filled level with the top flange angles, the estimated weight of the car being 31,400 pounds. Its length is 31 feet, length outside 35 feet, width outside 9 feet 4 inches, and height, from the top of the rail to the top of the flange angles, 9 feet 6 inches.

The side sills are of 15-inch, 32-pound channels and the center sills are 8-inch 13 3-4-pound channels. These channels are trussed with two rods, which are anchored at the centers of the body bolsters, the bolsters being constructed specially to receive them and make the anchorage secure. The body bolsters are of cast-steel, fitting between the side and center sills and bringing the center plates flush with the lower edges of the side sills. The side bearings are designed to carry a part of the load permanently. They consist of radial cones, placed in the truck bolster. The bolster has seats with corresponding angles to run over the cones. The end sills are 1-2-inch plates, secured and stiffened by reverse angles. The corners of the end and side sills are braced against end and corner shocks by angle braces. In addition to the body bolsters there are two connections to the center sills, which serve also as seats for the struts of the truss rods and the side sills are braced by four angles at about 5-foot centers.

The draft gear is carried by the center sills and two angles, the whole gear being made central with the 15-inch side sills. The arrangement of brakes differs from the usual construction in hopper cars.

The lower central portion of the car is divided into four compartments by the cross and central ridges, which divide the load and cause it to run to the discharging doors.

The trucks are of the diamond type with a new style of truck bolster and spring plank. The bolsters and spring planks and also the truss rod struts are of cast steel. In calculating the various stressses about the car a factor of safety of 6 was used and an additional 10 per cent.was added for the increased stresses due to vibration.

These cars are to be built by the Structural Steel Car Company, recently incorporated under the laws of Ohio, and large works are now being built at Canton in that State, for the construction of this and other types of steel cars.

Prices for Cleaning Air Brakes

Railway Age, July 19, 1901, p. 39.

At the recent M. C. B. convention, a decided change was made in the prices for cleaning triple valves and cylinders. The price for cleaning triples was increased 100 per cent. and for cylinders 33 1-3 per cent. The Rocky Mountain Club advocated the change. That this action was warranted is very evident. The deplorable condition of the air-brake after all efforts made to effect a change for the better, indicates plainly that some new plan should be tried. Should this opinion be substantiated many benefits will result. The recent instructions of the Interstate Commerce Commission to their inspectors cannot be overlooked by the general managers, regarding, as they do, the present condition of the freight air brakes and the necessity of appropriations for air brake testing plants. There is a feeling among a few that the motive for increasing the prices for air brake works was to furnish an entering wedge for a future effort to get an increase in M. C. B. prices in general. An official who is in a position to know assures us that such is not the case, and we think a little consideration of the facts will bear out that statement. It would be unfortunate if a mistaken idea of the motives which inspired the crusade for a betterment of the present condition of freight car air brakes is allowed to interfere, even in a small degree, with a full and fair test of the recent action of the M. C. B. Association.

The Grand Trunk Railway Fish Car

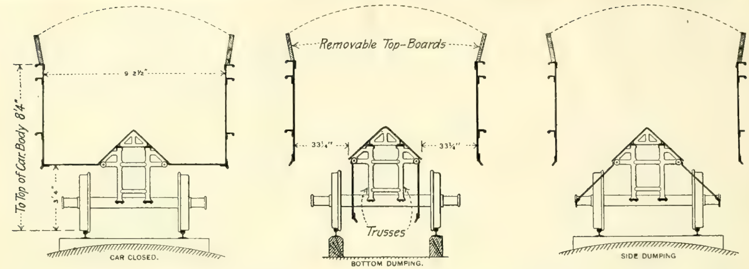
Railway and Engineering Review, July 13, 1901, p. 475.

The Grand Trunk Railway, of Canada, has recently constructed and put in service a car specially adapted for the distribution of live fish to waters along its lines. This car was built in the shops of the company at Point St. Charles, the requirements for the service being compartments for carrying fish in which an even temperature can be maintained; proper circulation of water and air in the tanks containing the fish may be had and sleeping and living accommodations provided for the attendants. The interior of the car is arranged with a series of galvanized iron tanks to hold from 1,000 to 1,500 fish. At one end of the car is an upper and lower berth, like those in a Pullman car, to accommodate two men. Ice for keeping the water at a certain temperature is carried in two compartments built for this purpose and holding about one ton each. Arrangements have been made for replenishing the water in the tanks, en route, which is done by attaching a hose to any of the hydrants at stations on the road.

Quick Acting Brakes in Austria

Railway Engineer (London), July, 1901, p. 200.

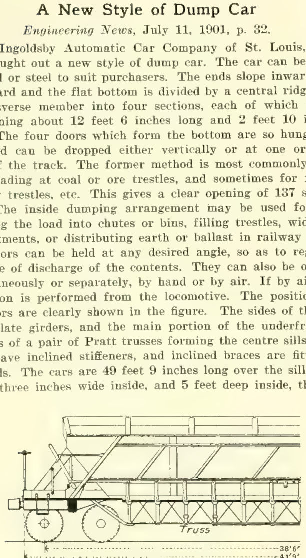
Brake tests took place last March on a section of the Areberg Railway, in order to try the different systems of brakes on long descents and in connection with long trains. Three trains of 30 carriages were fitted up for these trials, one with the automatic vacuum emergency brake of the Vacuum Brake Co., Ltd., one with the Westinghouse emergency brake, and the third one with the Schliefer brake. The Westinghouse train was in addition, equipped with the Westinghouse double brake. The trials took place according to a fixed programme, so as to work the different brakes under perfectly equal conditions. To the most of the participants it was a great surprise that the automatic vacuum brake was found superior to all others, also with regard to the working of it in an emergency, and particularly with regard to quiet and uniform travelling of the train.



A New Style of Dump Car

Engineering News, July 11, 1901, p. 32.

The Ingoldsby Automatic Car Company of St. Louis, Mo., has brought out a new style of dump car. The car can be built of wood or steel to suit purchasers. The ends slope inward and downward and the flat bottom is divided by a central ridge and a transverse member into four sections, each of which forms an opening about 12 feet 6 inches long and 2 feet 10 inches wide. The four doors which form the bottom are so hung that the load can be dropped either vertically or at one or both sides of the track. The former method is most commonly used in unloading at coal or ore trestles, and sometimes for filling railway trestles, etc. This gives a clear opening of 137 square feet. The inside dumping arrangement may be used for discharging the load into chutes or bins, filling trestles, widening embankments, or distributing earth or ballast in railway work. The doors can be held at any desired angle, so as to regulate the rate of discharge of the contents. They can also be opened simultaneously or separately, by hand or by air. If by air, the operation is performed from the locomotive. The positions of the doors are clearly shown in the figure. The sides of the car form plate girders, and the main portion of the underframing consists of a pair of Pratt trusses forming the centre sills. The sides have inclined stiffeners, and inclined braces are fitted at the ends. The cars are 49 feet 9 inches long over the sills, and 9 feet three inches wide inside, and 5 feet deep inside, the top



½ Elevation.

being 8 feet 4 inches above the rail. For carrying coal or coke, portable wooden tops can be attached, thus increasing the depth about 16 inches. The largest of these cars, built of steel, weighs about 38,200 pounds, and will carry 100,000 pounds. This gives a paying load of 65.3 per cent. of the total weight of the loaded car. The cars were invented by Mr. F. S. Ingoldsby, St. Louis, Mo. A number of cars, both of wood and steel construction, are now in use for hauling and distributing ballast, etc., in railway work. Coal, coke, ore, gravel, stone, etc., are also handled in tuese cars. The inventor suggests the construction of box cars of this type for hauling grain, which can be dumped directly into the boots of elevators, in much less time than grain can be discharged from ordinary box cars, even with mechanical shovels.

A young lady is like a railroad engine, for she draws a train, transports the mails, scatters her sparks about, and if her husband switches off on the wrong track, there is bound to be a smash-up.—*Railway Herald.*

Cost of Painting by Spray and Brush

American Engineer and Railroad Journal, July, 1901, p. 219.

"Car Builder" writes to the *Engineer* giving result of test with sprayer used by a large railway company and the figures obtained from another company relative to cost of painting where brush was used:

"Lucol paint was used, which has special advantages for spraying and which finishes a repainted car with one coat, giving a good uniform gloss, with no flat spots.

Cost of Spraying.

A. and D. car No. 1196 (in fair condition), sides and ends, 684 sq. ft. Paint used, 13 lbs.		$.95¼
Time required, 26 minutes		.06½
Total for body		$1.01¾
Roof paint, 9 lbs. 3 oz.	$.68	
Time required, 10 minutes	.02½	
		.70½
Total for sides, ends and roof		1.72¼
R. and D. car No. 3671 (in bad condition), sides and ends, 734 sq. ft. Paint required, 17 lbs. 4 oz.		$1.27¾
Time required, 17 1-2 minutes		.04½
Total for sides and ends		$1.32¼
Roof paint, 9 lbs. 3 oz.	$.68	
Time required, 10 minutes	.02½	
		.70½
Total for sides, ends and roof		$2.02¾

"Several other cars were sprayed, all showing the same results as to cost within a few cents. The following figures are given by another ɪoad using "wall" brushes and two coats of linseed oil, paste and japan dryer. The two coats were necessary to give a gloss. The car repainted was a 36-ft. box car.

Cost with Brushes.

Paint used, 12 gals., at 60 cents per gal.	$7.20
Time required, 3 1-2 hours	.52
Total for sides, ends and roof	$7.72

"The $7.72 represents the cost of applying 2 coats of paint. Because of the qualifications of the paint used with the sprayer one coat only was necessary. By taking half of the $7.22, or $3.86, and comparing it with the $1.72¼ and $2.02¾ a fair estimate may be had of sprayer versus brush."

"Inspection for Safety Only"

It was an English tourist travelling in Ireland, and he had, from sundry jolts and shakes, acquired mistrust in the axle of the railway carriage in which he was seated. Arriving at a station, he saw the usual man tapping the wheels to see if all was sound. He anxiously asked him if an axle of his carriage was all right. The man took no notice of his question, but passed on. Not at all assured, the tourist asked a railway porter why he had received no answer. "Because," was the reply, "he's stone deaf and did not hear ye, but sure, be as asy as ye can, and with the blessing of God the axle will hould until ye get to the junction." Needless to say the tourist changed his carriage.—*Railway Herald.*

Shop Practice, Machinery and Tools

The Birmingham and Other Wire Gauges

American Machinist, July 11, 1901, p. 788.

Messrs. Taylor, Taylor and Hobson of Leicester, England, write the *Machinist* to correct some false impressions of the gauge which exist in this country. They say that the "Birmingham," "Imperial," and the "Stubbs," are frequently confused. Since 1884, the name Birmingham wire gauge has had no legal standing in Great Britain, and is really obsolete. A new gauge called the "Imperial Standard Gauge," was legalized when the Birmingham was superceded. It is substantially the same as the Birmingham gauge, but differs in this one respect, if used in ordering goods, the buyer has no legal remedy against the manufacturer if the goods do not conform to the size the former expects. The "Stubbs" gauge is quite different. There are really two Stubbs' gauges, but the one best known to toolmakers originated with Stubbs for use in gauging what is called in America "drill rod," which is called in England "silver steel," or bright drawn crucible steel wire. In America there is what has been called the "Morse Gauge," of which a specification is given in the Morse Twist Drill Company's catalogue. This is very nearly, but not exactly the same as the Stubbs' gauge. It seems a pity that there should be two such gauges instead of one. The Stubbs' gauge is legal in England. The English firm further says that its experience in working to fine measurements has led it to abandon the practice of ordering to "gage," its orders sheet metal and wire in decimals of an inch.

Mixture to Produce Clean Castings

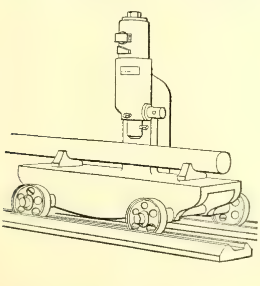
American Manufacturer, July 18, 1901, p. 879.

Marshal B. Owen, of Granite City, Ill., has produced a new facing for molds, which he claims is readily freed from the metal, so that a good clean casting results. It consists in the composition facing, such as is usually employed, combined with a chloride, whereby upon the introduction of the molten metal into the mold the heat of the incoming metal forms chlorine gas at the surface of the facing, which in its nascent state thoroughly cleans the casting, so that when the casting has been formed the facing is freed, leaving a clean, smooth finish on the casting. The improved facing is especially designed for use in steel foundries, where castings are made of steel; but it is obvious that there are other metals with which it can be employed.

Portable Hydraulic Shaft Straightener

American Machinist, July 25, 1901, p. 842.

The cut shows a hydraulic shaft straightener which may be used upon lathes, say, from 24-inch swing, or as to portable tool about the shop. The axles allow the wheels to move to accommodate the ways of the lathe, and V-blocks are used above which are adapted to the size of the work and the height of the

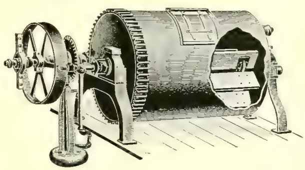


lathe centers. There is a rack movement to the ram, with steel pinion shaft, the ram itself being of tool steel. The pump is of bronze. The steel trussed girder bed is 25 inches long, 2 1-8 inches from the back of jaw to center of ram, and a 3 1-2-inch shaft can be bent easily. All the working parts are easy of access. The total height is 33 inches and the weight 375 pounds. It is made by the Watson-Stillman Company, East Forty-third street, New York City.

Recovery of Iron from Cupola Cinder

Iron Trade Review, May 2, 1901, p. 22.

The separation and saving of shot metal in the foundry is one of the problems in economy on which not a little energy has been expended. The Sly patent cinder mill receives the cinder as it is wheeled from the cupola, and a heavy steel crusher revolving loosely inside, crushes the cinder and frees the iron and coke. A centrifugal pump attached to the mill supplies a two-inch stream of water through one of the trunions. The water finds egress through the other trunion carrying with it the coke and pulverized cinder. The iron remains in the barrel by gravity. There follows a detailed description of the mill. Mr. Sly is quoted in a few remarks dealing with the prejudice of foundrymen against shot iron, the prevailing opinions being

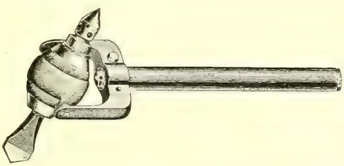


that it is too hard, he does not think this theory has any foundation in fact, and has not lost or gained any properties by its formation into shot. Steel heated and plunged into cold water becomes very hard, but softens again upon the application of heat. Re-melting of cast iron restores normal conditions. It is sometimes urged that fine shot charged into a cupola goes up in a shower of sparks, this is held not to be the case, because they are compact globules of metallic iron on which the air finds no kindling to start a conflagration. Mr. Sly lives at 110 Elm street, Cleveland, Ohio.

New Universal Ratchet Drill

Engineering News, July 25, 1901, p. 55.

A ratchet drill designed to be stronger and more rapid in operation than the ordinary tool of this sort, and at the same time capable of ready use in very restricted places is shown



in the accompanying illustration. The universal motion is secured by placing the axis of the two trunions on which the handle turns at an acute angle with the axis of the drill. A back and forth motion of the handle in any direction for about 2 inches will operate the drill, while by setting a screw in the handle in one of three countersinks in the outside of the ratchet case, a rigid handle is secured. There are five pauls engaging at one time, making sixty catches in each revolution

and saving lost motion. The feed screw on the larger drills is provided with a shoulder so that it cannot be unscrewed so far as to spoil the threads. The tool, capable of drilling a two-inch hole, weighs but 11 lbs. A smaller tool is made which weighs only 4 lbs. This tool measures 3 inches across head; a hole may, therefore, be drilled within 1 1-2 inches of a side wall. Aside from a variety of shop and bridge work, the drill is useful in tapping pipes, particularly in restricted spaces. It is made by the Waterbury Tool Co., of Waterbury, Conn., and is known as the Williams universal ratchet drill.

Fly-Wheel Insurance

Insurance Express, July 24, 1901, p. 1.

Fly-wheel insurance is now in the market, and people are wondering why it was not thought of before. No argument is needed to show that if any particular part of machinery is the source of an insurable hazard, it is the fly-wheel. It whirls at a tremendous rate wherever power is generated, and occasionally such a wheel breaks and the fragments thrown off by centrifugal force have almost the destructive power of a projectile fired from heavy ordnance, resulting in either damage to machinery, property, bodily injuries or loss of life. The owner of the wheel is liable for these losses, and the new insurance relieves him of that liability. The Fidelity and Casualty Company, of New York, has brought out this new line of underwriting, and Mr. William H. Boehm is in charge of the department as superintendent.

Electric Equipment, Machinery and Appliances

High-Speed Electric Railways in Germany

Railway and Engineering Review, July 20, 1901, p. 493.

The following purports to be the substance of an interview by a representative of one of the London papers with an American engineer who recently went over the ground of the Hamburg-Berlin electric railway, now under construction: "The Kaiser has two objects in interesting himself in this railway. In the first place, he desires to benefit by the undoubted financial success that will attend the project. He also wishes to set his countrymen a royal example in the development of electricity. The road, when completed, will be unique among the world's electric systems. It is being built on an embankment 20 feet high, 54 feet wide at the top and 112 at the bottom. All intersecting lines go over or under the embankment to avoid grade crossings. Ten trains an hour will be run in each direction. Motor cars will be fitted with sharp-nosed fronts to overcome the resistance of air incident to high speed. The cars are of huge design. The American air brake is the only piece of Yankee equipment so far ordered." Readers are familiar with the intention of this project, which is to run trains at a sustained speed of 100 miles an hour and upwards.

Manchester to Liverpool in 20 Minutes

Railway and Engineering Review, May 4, 1901, p. 295.

Mr. F. B. Behr says the original form of "mono-rail" adopted by him was devised by M. Charles Latrigue, a French engipeer. The absolute impossibility of derailment when going at very high speed, through comparatively sharp curves is its principal recommendation for high speed, and it results in absolute safety and economy in construction. The cost of the monorail for average speeds, of at least 100 miles per hour, would be about the same, or slightly less than the cost of an ordinary two-rail railway constructed for maximum speeds of 60 miles per hour. There are many causes which contribute to this safety which can be best understood by examining the construction of the carriage as it fits the permanent way. An ordinary railway carriage is held to the rails by a flange of about 1 5-8 of an inch deep, the arrangement of this carriage really is equivalent to a continuous flange of over 3 feet in depth.

[According to a dispatch from London, says one of our contemporaries, the scheme for an electric express railway between Manchester and Liverpool on which trains will run at very high speeds, has received Parliamentary sanction. The train will run on a track shaped like the letter A, with the single rail at its apex. It will consist of one long car, which will straddle the track, so to speak, one-half hanging down on each side, just as a pack-saddle hangs on the back of a mule. It will be prevented from rocking by means of side rails which act as guides. Each car will have its own motor. The distance, 33 miles, will be covered in 20 minutes—a speed of 110 miles per hour. At present the speed of trains by the Cheshire Lines Committee is about 46 miles per hour.—Eds. Railroad Digest.]

Change From Steam to Electricity

Western Electrician, July 20, 1901, p. 36.

The Denver *Times* says that Chief Engineer Cowan, of the Colorado & Southern Railroad has been instructed by President Trumbull to prepare recommendations as to the best plans for "electrifying" the Canyon and suburban lines of the road for passenger traffic at the earliest possible date. Mr. Cowan will recommend what system he considers best adapted to the purposes of the road, supply estimates of the cost, and inform the management how much time will be required to install the new system. A report from the officers of the New York, New Haven & Hartford Railroad to President Trumbull is favorable to electricity. One strong advantage that is being considered by the management of the Colorado road is the cheap fuel to be utilized in generating electricity. With facilities already sufficient to furnish power for one of the principal Canyon lines, and facilities at hand for establishing a large power plant at some convenient location in the northern coal fields, power for the new system of operating passenger trains can be produced at a minimum cost.

The Edison Storage Battery

Machinery, July, 1901, p. 353.

During the last few weeks wild claims have been put forth in the daily press in relation to the new Edison storage battery. Its actual merits can only be established by its standing the test of time. A storage battery is simply an apparatus in which energy is stored; it can, therefore, only give back what has been put into it. In actual practice it cannot give back this much, for there is a certain loss in the act of charging, as well as during discharge. This loss, however, is between five and ten per cent. under average conditions. The directions in which storage batteries can be improved are in the matters of durability and weight. Batteries now in use are made of lead and weigh all the way from 170 lbs. down to about 50 lbs. per horse power hour. The proportion of the battery in which energy is stored weighs about 12 lbs. per horse power hour, and the balance goes into supporting frames and containing vessels. Lightness is therefore often secured by a sacrifice of durability.

The Edison battery is made of iron and nickel and is said to weigh about 53 lbs. per horse power hour. If after a year or so of actual service it is shown that the deterioration is not any faster than in lead batteries of double the weight, then the superiority of the Edison over the lead batteries for all portable service will be demonstrated, assuming that both kinds sell at the same price.

Electric Train Lighting in India

Iron and Steel Trades Journal (London), June 29, 1901, p. 719.

The mail trains on the R. M. Railway are now equipped with electric light. Each vehicle of the mail train is provided with a certain number of storage battery boxes to carry the requisite supply of electricity for its lamps. These are stored away in cases beneath the seats. At the terminal the exhausted boxes are replaced by fresh ones, and these are re-charged at the re-charging station. The batteries have been in use since March, 1899, and experience has proved their complete reliability under the various and often trying conditions of climate and circumstances existing on the R. M. Railway.

Conducting Transportation

The Telephone in Railroad Service

Electrical World and Engineer, July 6, 1901, p. 22.

At the recent meeting of the Association of Railway Telegraph Superintendents, Mr. F. P. Valentine showed the remarkable growth of the use of the telephone for railway operation. It is estimated that at present in the United States there are some 200 private branch exchanges operated by various railroads, connecting over 5,000 stations. The New York ticket office of the Fall River line is one of the busiest in the country from a telephone point of view, where it has been found invaluable. It is also very useful in the freight office, where calls for rates and information as to shipment and delivery can be quickly furnished. The receivers of freight can be immediately informed on its arrival and quick deliveries be assured, thus avoiding congestion in the freight houses. Insufficient telephone equipment has lost much business, which demanded an immediate decision. In installing telephone systems a great mistake is often made by railroad companies in endeavoring to economize in the number of instruments. Enough should be provided to care for every branch of the service under any conditions that may arise. One of the largest passenger terminals in the country has a very complete telephone service, the main exchange being in the office building. All branches are thus connected, and there is hardly a place in the immense plant where a man is located that cannot be reached at once by telephone. All wires are underground, and there has not yet been an instance of any failure in the service day or night.

Simplification of Train-Despatching

Railroad Gazette, July 19, 1901, p. 518.

A few months ago we had occasion to give an account of certain radical changes in the time-tables of the Chicago, Burlington & Quincy, whereby the number of telegraphic train orders required to be used in running the trains on double track was greatly reduced. The change was, in brief, to allow all trains (on double track) to proceed under a clear block signal, without regard to whether a faster train might be following. For example, a block signal operator, learning that a passenger train is ten minutes late, allows a preceding freight train to go on one station farther before taking the side track; whereas under ordinary rules this could be done only by written permission from the despatcher, in the full prescribed form. Frequently the possibility of saving a few minutes' time for a freight train in this way is not discovered until it is so late that there is not time to inform the despatcher and for him to write and transmit the order; so that the new regulation makes possible many small savings; and, of course, some larger ones.

The result is to be summed up in the statement that the road now gets full benefit of all the saving of time that can be effected in two directions; (1) movements of trains (as, for example, to and from side tracks), which can be made quickly enough to get to another station ahead of a passenger train, but which the conductor could not beforehand assure the despatcher that he could certainly make; and (2) by eliminating the writing out of train orders and the delay involved when the making of the orders for a number of trains is intrusted to one person.

We do not need to remind the reader that the good record for celerity of movement that the Burlington has made is due in large degree to the use of the space interval and fixed signals. Railways in England have employed this plan for years. What degree of success they accomplish we do not know; but as the employees' unions have lately been complaining on about every ground that they could think of, and have not complained of long delays on side tracks, it is perhaps fair to assume that such delays are not common. We judge that all trains (except local freights) run with a better degree of regularity in England than in this country, as the loudest complaints about passenger train delays that find their way into print are those concerning comparatively short distance trains which carry the heavy traffic to and from the cities; which delays, though perhaps sometimes numerous, are largely on four-track lines, where freight trains do not bother them; and they seem to average but a few minutes each.

The Burlington has three tracks between Chicago and Aurora, and thus does a good deal of "running around" such as is done on four-track roads; and in using this means of getting important trains past those of less importance, the despatchers and trainmen have frequent object lessons of a kind that are not so obvious on a four-track line; we mean the lesson that time can often be saved by running a train "against the traffic;" that is, running an eastbound train on a westbound track, when westbound trains do not need it.

On the Burlington the third or middle track is, from 4 a. m. to 4 p. m., normally an eastbound track; and from 4 p. m. to 4 a. m. westbound. An eastbound conductor desiring to use this track at, say 3:30 p. m., may do so without orders, provided he can clear the track by 4 o'clock; but a few minutes later he cannot do so without an order from the despatcher. At this late hour the only plan under which the middle track can be made available for eastbound trains is the plan of treating it exactly like a single-track railroad.

Trains to be Run by Telephone

The Sun (New York), July 10, 1901, p. 6.

General Superintendent Clarke of the Lackawanna Railroad made the announcement some days ago that his road in the course of a few months will be managed by the telephone instead of by telegraph as at present, at a saving of about 60 per cent. in the hire of telegraphic operators. He says that the telephonic system has been placed on the Morris and Essex branch, where it is used successfully, and that it is being put in as quickly as possible on the Scranton branch. First, the telephone system will be given a thorough trial on the branch lines, and if it proves successful there will come into general use on the main line from New York to Buffalo, totally superseding the telegraph.

What is Baggage?

Railway Age, July 19, 1901, p. 37.

Are bicycles baggage? Such was the vigorously debated question a few years ago, variously answered by the railways, but with the result that these vehicles were received in baggage cars and checked like trunks, sometimes free and sometimes as excess. Bicycles have ceased to travel and to annoy greatly, but now it is tricycles and quadricycles of the automobile order that apply for admission to the baggage compartment. There is no more reason for treating as baggage a passenger vehicle propelled by legs, electricity, gas or steam than one propelled by horse or ox power; and yet some kindly passenger agents are disposed to favor carrying motor vehicles as excess baggage, while they would refuse to check a cart and horse, to say nothing of a coach and pair. The automobile is coming to stay, but it ought to come on its own wheels, and not ask the railway companies to carry it when it is tired. It is too big an infant for this already, and the statement that Mr. Vanderbilt has imported a machine that runs seventy-miles an hour and weighs forty tons, raises the question whether the automobile will not eventually be big enough to carry the railway car. When that time comes, will the automobile passenger agent be disposed to check the (steel) tired passenger car as baggage? If not, why not?

American Roads are Honestly and Ably Managed

Common Carrier, July, 1901, p. 13.

Mr. Thomas F. Woodlock of the *Wall Street Journal*, in saying that our railroad securities are the best investments, mentions the following points that lead him to such a conclusion: 1, Stability of Profits.—Our railroads report as profits only two-thirds to three-quarters of their real earning capacity. Little or no capital is being spent for improvements, but income on an enormous scale is so used. Last year the Penn-

sylvania, for every dollar paid in dividends put a dollar of income into the property. 2, Increase in Efficiency.—In this country alone is there such a thing as really cheap transportation of freight by railroads. The increase in the average freight train load on our railroads in ten years is more than the entire average train load of British roads at present, viz., 75 tons; this is on the increase and its possibilities cannot be estimated. 3, Honest Management.—Our railroad directors and managers are men who mean to do right. They cannot be called either incompetent or dishonest; they are capable, keen and properly ambitious. Our young railway men understand theory and practice, and in a few years will astonish the world with their achievements as to cheap transportation. 4. Community of Interest.—We shall see the fruits of recently formed alliances in stable rates henceforth. Our rates will still fall, not as a result of ruinous competition, but as an outgrowth of expanding business.

Medical and Surgical Matters

"First Aid"

Railway Surgeon, July, 1901, p. 46.

This is the title of a paper recently read by Dr. W. D. Travis before the annual meeting of the Georgia Railway Surgeons' Association at Atlanta, Ga. He drew attention to the spread of this movement in various countries, and to its becoming the cause of saving life and limb, as well as decreasing damage suits. The low death rate among the wounded in the Philippines and in South Africa, he said, is largely due to the use of first aid packets and methods. It is time that the railway employees of America be as well versed in this humane work as are their cousins across the Atlantic. Dr. Travis related the various means that the average person should use in case of injury to another, and concluded by saying that, if employees knew the importance of first aid, they would be glad to learn it.

Invalid Railway Travel in England

Transport (London), July 12, 1901, p. 35.

This article is composed of extracts from a paper by Dr. Corner, of St. Thomas' Hospital, contributed to the London *Lancet*. The greatest improvement in invalid travel has been accomplished recently by the London & Southwestern Railway, when it constructed its hospital train for the use of the wounded returning from the war. It consists of five carriages 48 feet long run on bogies. They represent the acme of comfort and are made to carry many and not a few invalids. The Great Western Railway offers the largest and finest invalid saloons with all the most modern improvements. Of lines on which the invalid travel is less, the London & Northwestern Railway and the Caledonian Railway stand out distinct in offering to invalids a temporary modification of their splendid family saloon carriages. All the great railways build some special coaches called invalid saloons. These saloons are usually divided into four compartments—one for the invalid, one for attendants, one for luggage, and one to be used as a lavatory.

Only one company has an invalid coach running on bogies. The long, luxurious carriages of the best trains have too much room and have too much unnecessary weight to be built for invalid saloons, hence the shorter and older type of six-wheel coach is generally adopted. The patient's couch may be fixed or movable. On some lines hooks are put in the roof so that a special mattress or hammock may be slung. Special straps anchor the mattress to the floor, thus limiting oscillation. On certain lines the couch can be lifted and used as a stretcher to convey the invalid in and out of the carriage. Many other lines will supply a bed where it is required. Others have their invalid couches slung by spiral springs from the roof, and movement restrained by leather straps. This arrangement, if required, must be asked for. The doors of invalid saloons are usually of double width, to enable the patient to be carried in or out upon the couch upon which he has been brought to the station. Occasionally an invalid chair is supplied on which the patient can be wheeled about the compartment, such as to and from the lavatory. An invalid bed table is sometimes provided. The Midland and Great Western Railways alone have arrangements for warming food, etc., supplied in the carriage, a Bunsen stove being provided. The charges vary from four first-class and three second-class fares to seven first-class fares. Some charge 1s. per mile, with minimum charge of 40s., while on the London, Brighton & South Coast Railway the rate is 9d. per mile, with a minimum of 40s. All passengers must pay first-class fares except servants, who pay third.

Midland and Great Northern Ambulance Work

Railway Herald (London), June 29, 1901, p. 22.

An interested company of spectators, including Mr. Petrie, traffic manager, witnessed the competition between ambulance teams composed of Midland and Great Northern men. In addition to the annual challenge cup, three prizes were offered for the best individual ambulance workers in the competition, and to these were added three prizes given by the Norwich corps. The examination was divided into three sections, viz., stretcher work, viva voce and practical work, and fireman's lift and artificial respiration, the maximum number of marks being 470. The competition lasted till a late hour, nearly an hour being taken for the examination of each squad. Norwich locomotive department won with 394 marks, South Lynn (No. 1), the former holders losing the cup by only one point. Ten teams competed. There are at present 450 members at the various stations on the Joint Committee's lines.

Railway Ambulance Competition

Railway Herald (London), May 11, 1901, p. 17.

The sixth annual competition for the Maiers' Railwaymen's Challenge Cup took place at Ayr passenger station April 21. The examiners were Drs. Rowand and Young. The first two teams made 54 and 44 points, respectively, out of a possible 60.

The Carlisle Joint Ambulance Class recently held a smoking concert at Bowling Green. The great interest taken in the work of First Aid was shown by the presentation by the class of two testimonials, one to the lecturer, Dr. H. A. Lediard, and the other to the secretary of the organization.

The class was composed of Caledonian, North British, Glasgow and Southwestern Railways and Citadel Joint Station servants. All passed the examination and received medallions and certificates.

Miscellaneous

The World's Dependence Upon the Engineer

American Machinist, June 6, 1901, p. 651.

In an address, Mr. William H. Maw, of the Institution of Mechanical Engineers, spoke as follows: "When we remember how the developments of civilized life depend upon the products of mechanical science, it is astonishing how inadequately the ramifications of mechanical engineering practice are appreciated by the average citizen. It is only by entering into very considerable detail that the real facts of the case can be brought home to such a person, and these facts are, without doubt, very striking. They prove that, from the time we rise in the morning to when we retire to rest, there is scarcely a moment during which we are not indebted to the mechanical engineer for our necessities and our comforts. His work pervades our very existence. It may easily be shown that there is scarcely an article we use in the production of which some mechanical device has not been employed. Our daily wants include the products of textile machinery, mining and metallurgical appliances of the most varied description, metal working machinery, machinery of various kinds for the treatment of food products—including milling machinery, sugar-making and refining machinery, agricultural

machinery, and so on—paper making and printing machinery, sewing and other machinery used in the manufacture of our wearing apparel, and numberless other mechanical devices of a minor kind. Then, again, the machinery constituting the mechanical equipment of our waterworks, our gas and electrical works, etc., contributes greatly to our health and comfort. Moreover, the mechanical engineer, in addition to designing and constructing all this varied machinery, has to supply the motive power by which it is operated, and the tools by which the machinery and its motors are made; while, beyond all, it is to him that we are in the main indebted for the effective working of our modern systems of transport by land and sea, and for the blessings which they confer.

Advice to Young Engineers

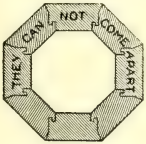
Western Electrician, July 20, 1901, p. 38.

The editor of the *Western Electrician* thoroughly approves of the advice recently given to the graduates of Rensselaer Polytechnic Institute by Col. H. G. Prout. The speaker made some observations, says the *Western Electrician*, which will be cordially commended by those whose serious business it is to assist in the preparation of technical literature. The average American college graduate is too frequently unable to express his ideas clearly and accurately, either with tongue or pen. The lack of training in English composition is as real a defect in the preparation of the engineer as it is in that of any business or professional man. The editor says that such a condition of affairs is pitiful. Still, the young engineer can improve himself in English if he will follow Col. Prout's suggestions, some of which are: Read good English, and do it thoroughly and constantly; use the newspapers only for intelligent information; discard the magazines; read the Bible, which contains the noblest English; read Shakespeare and devote attention to Abraham Lincoln's addresses and state papers; for form as well as thought, read Huxley, and let Trackeray suffice for fiction.

Practical Built-Up Column

American Lumberman, May 4, 1901, p. 25.

Trouble has always been experienced by contractors and builders, when specifications called for wooden columns, to furnish something that would not open, check or split. The methods generally in vogue have been to use either the built-up column made up of sections assembled in the same manner as the staves of a barrel, or the solid column with a large hole bored through its center. But these are not altogether satisfactory. In the case of the old style built-up column the great trouble has been that after a time the several sections may open up and it is necessary either to put in thin wood fillers or



fill them with putty, which in time, owing to the action of the weather, and other causes, cracks, and gives the column an unsightly and uneven appearance. In the solid column this cracking and checking is still greater, and although in many instances specifications call for the hole that is bored through the center to be filled with linseed oil, to keep the wood soft and thus in a measure obviate splitting and checking, it does not always succeed. The section of the column presented herewith, however, seems to have filled a long felt want in this direction. In this column, manufactured by the Hartman Bros. Manufacturing Company of Mount Vernon, N. Y., the joints are made interlocking, thus making it impossible for them to come apart, as they are practically united as if made of one piece of wood. These columns are made in all sizes for outside or inside trim, and of any and all kinds of wood.

Injury to Coal by Exposure to Weather

Scientific American Supplement, July 20, 1901, p. 21,365.

Coal exposed to the open air loses its heating power slowly. This loss, says an editorial in the *Engineer*, is due to a slow combustion or union of the coal with the oxygen of the air, which differs from ordinary combustion only by its slowness and the small part of the coal which is liable to combustion under such circumstances. The author goes on to say: Owing to the slowness of the operation the heat generated has an opportunity of escaping, and thus there is no marked rise of temperature. If, however, the heat thus generated is prevented from escaping, it may become banked up, so to speak, in the coal pile, and a rise of temperature may follow which will tend to accelerate the combustion, and thus these two conditions will progress, each tending to increase the other, until finally active combustion breaks out and *spontaneous combustion* is said to result. In general, however, danger of spontaneous combustion is not likely to arise under the conditions affecting the stationary engineer, and he is chiefly concerned with this slow combustion as an influence which may affect the quality of his coal. The chief external conditions which may affect weathering are moisture and temperature. With coal free from iron pyrites the presence of moisture is believed to slightly retard the operation of slow combustion, and thus exercise a beneficial influence. On the other hand, with a coal rich in iron pyrites the conditions are reversed. This substance readily oxidizes at ordinary temperature, the operation being aided by temperature. As a result of the operation heat is developed, and the pyrites are destroyed, in consequence of which the lump of coal tends to break up into small bits, thus exposing fresh surfaces to the air.

New Method of Testing Strength of Iron and Steel

Railroad Gazette, July 19, 1901, p. 520.

The machine employed is a modification of an ordinary punching machine. The sample bar is supported horizontally on two blocks with blunted edges forming part of the bed, and instead of a punch, a blunt vertical chisel is used, a little broader than the sample, upon the center of which it descends. The samples are uniform size, 10 millimeters wide by 8 millimeters thick and about 25 millimeters long. Such small pieces are easily cut from waste fragments by means of little saws spaced at the requisite distance apart. The samples are also cut or notched at the bending point by a saw 1 millimeter broad, cutting to a depth of 1 millimeter, and then by a special machine marked by equidistant cross lines. The ductility of each part of the bar can be measured by a self-recording photographic apparatus attached to the machine. The machine for bending the samples registers the pressure in pounds employed, and also the distance through which the punch descends. Thus a closed graphic diagram can be drawn showing the entire experiment up to the breaking point. A pair of shears also cuts through the sample bars, and the resistance in this cutting is registered in pounds.

American Goods at Calcutta

Consular Reports, July 22, 1901, p. 2.

The value of all manufactured goods imported into India during the year ended March 31, 1901, was about 250,000,000. Of this, nearly 67 per cent. came from the United Kingdom, while less than 2 per cent. came from the United States. With well directed efforts we would secure a much larger proportion of this trade. If a museum of American goods, similar to the Japanese museum in Bangkok, were established in Calcutta by the American manufacturers, where samples could be inspected and the goods delivered be compared with them, it would greatly increase our trade. We buy largely of Indian products. There is no reason why we should not export to India on a much larger scale than we do. The consul lays special stress on the influence such a museum might have on the trade in railroad machinery and appliances.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters

Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

M. C. & P. A. L. Portrait Gallery

JOHN D. WRIGHT

It affords us pleasure to present herewith to our readers the portrait and sketch of Mr. John D. Wright, general foreman painter of the B. & O. system.

Mr. Wright was born near London, England, in the year 1865, and came to the United States with his parents when he was about 10 years of age, settling in Mattoon, Ill.

He attended the Mattoon public schools for a few years, and then started to learn painting under his father, who was at that time, and is now, foreman painter of the I. & St. L. (now "Big Four") shops at that place. After serving under his father for about five years, he went to Chicago and secured a position in the Rock Island shops, and was under Mr. Rattenbury for the next seven years, first as journeyman, then as foreman painter of the Des Moines Valley division shops at Keokuk, Iowa. After that he was assistant to Mr. Rattenbury and in direct charge of the painting at the Chicago shops. From this position he went to the C. & N. W. Co.'s West Chicago shops, where he was foreman for the next three years. He left the North Western system to accept a position with the Pullman Company, and during the next three years was foreman painter in Pullman, Ill., having charge of the painting of all new passenger equipment built at that place, also the painting on repaired sleeping cars.

In December, 1896, he moved to Baltimore, Md., and since that time has been general foreman painter of the B. & O. R. R. Co., with headquarters at the Mt. Clare shops.

J. D. WRIGHT

Car Painting as Related to the Car Service Department

An incident in the recent experience of this writer is worth telling here to keep some other fellow out of the same trouble, though perhaps it may be a long time before similar circumstances will occur again. A box car of the Fitchburg R. R. found its way out to Michigan, after the lease of that road to the B. & M. last July, and became so damaged as to require rebuilding there. In the course of time he was asked to forward a blueprint, stencils, and instructions how to paint and mark that car; which he did in December last, to the effect that these cars were all now being painted and marked to Boston & Maine standards, and stencils were therefore sent and the car was painted and marked accordingly. Good scheme to save repainting and marking one of these cars at home! Now the curtain drops on Act I., Scene 1, and time enough elapses to go out several times for refreshments before the curtain rises again.

Act II., Scene 2.—Enter chief clerk car service department, with ditto car department, and an animated colloquy with the M. C. B. (this writer in a wing behind the scenes) occurs, the animus of which, by the C. S. D. clerk, was that that car could not be brought home on a "home route card," but its hauling home would have to be paid for to every road over which it passed from Michigan to Boston! The upshot of the talk was that the M. C. B. assured the C. S. D. clerk that the car would be remarked back to Fitchburg R. R. and take its old number again.

Act III., Scene 4.—(We will omit Scene 3 for obvious reasons.) Stencils, etc., sent by mail May 3 to mark B. & M. car eleven thousand one hundred and eleven back to Fitchburg 8,013! (It's the "13" attached to this number that's doubtless responsible for this.)

Act IV., Scene 4, will be the remarking of that car back to Boston & Maine when the prodigal comes home. Lots of trouble has been occasioned by this little act to economize, in which this writer has had his full share, and he takes his full proportion of the blame. Moral: "Things are not always what they seem." A car painted and marked with another name out in the Badger State is not the same car in the Bay State and other States. "What's in a name?" Much! If Sarah Brown gets a pass all to herself and goes to the next M. C. B. convention to see what she can see and gets married and consequently her name changed to Sarah Smith, she has no right to return on that pass made out to Sarah Brown; but, dollars to doughnuts, she will! Here's where human freight gets the better of box cars and things.

Paints and Varnishes that "Dry from the Bottom"

Paints and varnishes that "dry from the bottom up" are probably about as scarce as hen's teeth and crocodiles' wings. The term is a kind of a misnomer, anyway. If it was said that they dry through equally it might be nearer the truth. A paint or a varnish that begins to dry at the bottom is about parallel to a well that begins to be dug at the bottom; they are alike unnatural. It is the oxygen of the air that a paint or varnish takes to itself that drys it; and what is more natural than that its surface, in contact with the air, should first be affected with its drying properties?

That there are paints and varnishes that *seem* to dry from the bottom upward in comparison with others that seem to crust or skin over on the top, or outside, and there remain for days or weeks a soft, sticky mass, susceptible to warm finger imprints, especially in sticky, dog-day weather, is true; for what painter of experience has not met with both, to his pleasure in the former case and to his unutterable disgust in the latter? It must be the nature and amount of driers used, as well as the general composition of the substance that accounts for it. That some will take up more oxygen than others is also true, and likewise an evidence of their nature.

For my part I prefer an outside car finishing varnish that is slow to "set," slow to dry at first, and which can be nearly taken up on the finger the first half day after application, which then begins to rapidly dry in the afternoon, and the next morning is not only out of the way of dust, but quite hard, especially in cold weather with steam heat. On the other hand, a varnish that sets so quickly that it is impossible to wipe it up in five or less minutes after being laid and rapidly "skins over" and in a few hours gets to a point where it remains and is apparently no more dry in a week than the second day, has no place in our vocabulary

of praise for a worthy article. Something is wrong and should be remedied, and the manufacturer should take it to heart and attend to it.

As to a paint with these traits of course a japan color will appear to dry simultaneously through and through on account of its internal drying nature; but an oil paint for freight cars, buildings, etc., to be durable should have a disposition to first "skin over" before drying underneath. Its durability might well be suspected if other symptoms were manifest. It would seem that it was composed largely of resin or something that has a tendency to "go solid" too quickly. Doubtless a water color composed of plaster of paris and water will come the nearest to "drying from the bottom up" of anything that can be considered, but that would hardly be called a paint.

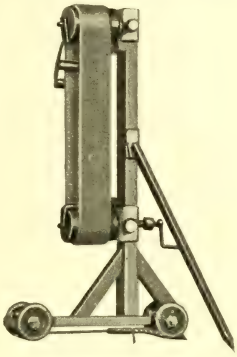
Furman's Sandpapering Machine

Editor Railroad Paint Shop:

I expected before this time to have my sandpapering machine on the market. I enclose a print photo from the model showing what it would look like and giving an idea how it is intended to be operated.

The device is intended to be about 11 feet in height, or at least high enough to reach to the top of a coach or caboose. The rollers are 12 inches in diameter and the sanded belt is 14 inches wide. The manner of manipulation is to place the device so that one side of the sanded belt would be parallel with and about one-half inch from the side of the car to be sandpapered. A rotary air machine (carpenter's boring or machinists' drill may be used) is attached to the journal which revolves the bottom roller, and while the belt is moving at the rate of several hundred revolutions per minute, an instrument, shaped like a plasterer's trowel, is held in the hand of the operator and pressed gently on the inner side of the belt—just pressure enough to cause the sanded side of the belt to touch the side of the car to be sandpapered. The trowel is not held in one place long, but should be slowly moved up and down until the surface is sufficiently rubbed down, which is done very rapidly. When the width of the belt has been sufficiently sandpapered, the machine is moved on to the next adjoining part of the car and sandpapered as before, and repeated until the whole length of the car has been rubbed down. In addition to the large rollers, it is provided with two small rollers for the purpose of causing the cloth belt to conform to the shape of the work, as, for example, to press the belt against the upper part of the side of the coach and at the same time hold the belt in such manner as to prevent its touching the letter panel, window sills, angle irons at bottom of tanks, rows of rivets, flange of tanks, etc.

I claim that one man can, with the machine, do more work in a day than ten men could do without it, and do a much more thorough job on such work as cabooses, burnt-off coach work prior to priming, sandpapering tanks, and the like. And I also claim that the saving in material is enormous; I do not know exactly how much yet.



SANDPAPERING MACHINE

The machine, when a lot of sash or blinds are to be sandpapered, is suspended on two trestles just one-half inch above the sash, in a horizontal position. The work is to be laid on a table of such height as to enable it to be slid under the belt and turned about. The machine may be running all the time, but the sandpapering stops as soon as the trowel-shaped instrument is removed from the belt. Should the operator prefer making his own belt he can do so at less expense by getting "drilling" (cloth) and buying liquid glue and sand prepared for the purpose. It is astonishing how much surface can be sandpapered before the sand-cloth is worn off. The machine is also provided with a stiff brush lightly pressed against the sanded cloth, which dusts out the paint dust and keeps the sandcloth from clogging up.

R. S. FURMAN,
Foreman Painter C., N.-O. & T. P. R. R.,
Chattanooga, Tenn.

Official Notice of Annual Convention

Secretary's Office,
Kent, Ohio, August 1, 1901.

The thirty-second annual convention of this association will be held at Buffalo, N. Y., September 10, 11, 12 and 13, 1901, convening at 9 o'clock A. M., on Tuesday, the 10th. The official headquarters will be at the Columbia Hotel, where a meeting room in which to hold the daily sessions has been secured.

This hotel is on the European plan. The rates are from $1.00 to $3.00 per day for each person, according to location and size of room. Rooms may be engaged by writing to the hotel, stating what priced room is desired, and it is urged upon the members to secure rooms as early as possible so that all may be accommodated at this house, where it will be most convenient to attend the meeting.

A cordial invitation is extended to foremen car and locomotive painters throughout the States and Canada to meet with us in convention and receive the benefit of the discussion on the several subjects on the programme.

The committees on the several questions will please send a typewritten copy of their reports to the secretary ten days previous to the day of meeting.

The following programme, with the committees appointed on the several subjects, will be introduced:

1st. Is there a method of successfully treating passenger cars (going through shops for revarnishing) which are more or less cracked and which have recently been cleaned at terminals with emulsion or other cleaners containing mineral or non-drying oils?

W. J. Russell, G. R. & I. Railway, Grand Rapids, Mich.

C. B. Harwood, C. & O. Railway, Huntington, W. Va.

2d. In a material sense, what progress has been made in terminal car cleaning?

William Vogel, Missouri Pacific Railway, St. Louis, Mo.

S. H. McCracken, L. H. & St. L. R. R., Cloverport, Ky.

3d. Practical suggestions regarding interior decoration of passenger cars.

George Schumpp, L. & N. R. R., Louisville, Ky.

A. T. Winchell, American Car & Foundry Company, St. Charles, Mo.

Frank Taylor, late of Barney & Smith Manufacturing Company, Dayton, O.

4th. Is it practical and to the interest of the railroad companies to adopt a piece price for all classes of painting repairs in the car paint shop without employing a certain percentage of day men?

W. H. Truman, Southern Railway, Columbia, S. C.

5th. The relations which should exist between the railroad company's purchasing powers and the master painter.

J. A. Gohen, C., C. C. & St. L. Railway, Indianapolis, Ind.

6th. What is the best paint material to use for the protection of iron and steel tanks on locomotives after the same has been prepared to receive it?

C. I. Eagle, L. S. & M. S. Railway, Cleveland, O.

Eugene Daly, C., C. C. & St. L. Railway, Bellefontaine, O.

R. B. Pebbles, L. S. & M. S. Railway, Elkhart, Ind.

7th. Has the painting of freight cars with the spraying machine shown that there is any economy in its use? Is it not rather an additional cost over brush painting, and does it not produce work of an inferior quality?

T. J. Mullally, the Armour Car Lines, Chicago, Ill.

M. W. Stevens, L. S. & S. R. R., Drifton, Pa.

J. G. Ginther, Wabash Railway, Moberly, Mo.

8th. What is the best method of preparing steel freight cars for paint; and what is the best material to use?

B. F. Seisler, P. & W. R. R., Allegheny, Penn.

B. T. Wynn, Pennsylvania R. R., Pitcairn, Pa.

Eugene Laing, N. C. R. R., Elmira, N. Y.

9th. Report of Committee on Tests.

W. O. Quest, P. & L. E. R., McKees Rocks, Pa.

T. J. Rodabaugh, P., Ft. W. & C. Railway, Ft. Wayne, Ind.

Frank Crocker, K. C. Ft. S. & M. R. R.

Car cleaning tests to be reported at the convention by

W. C. Fitch, Southern Pacific Railway, Sacramento, Cal.

J. A. Gohen, C., C. C. & St. L. Railway, Indianapolis, Ind.

C. E. Copp, B. & M. Railway, Lawrence, Mass.

John Rattenbury, C. R. I. & P. R. R., Chicago, Ill.

J. A. Putz, W. C. R. R., Stevens Point, Wis.

J. A. P. Glass, Y. & M. V. R. R., Vicksburg, Miss.

W. L. Marsh, W. Railway of Alabama, Montgomery, Ala.

C. D. Beyer, L. & N. R. R., Pensacola, Fla.

T. R. Cowan, C. P. Railway, Montreal, P. Q.

QUERIES.

1. Can a paint be made that will dry from the bottom up?

2. What is the best method of making illuminated numbers for locomotive headlights?

3. What is the best method of treating front ends of locomotives with a view of keeping them in good condition?

4. It is advisable to add wax to varnish in order to deaden the lustre in imitation of a rubbed surface?

5. Can a sand blast be operated successfully in a railway car and locomotive paint shop?

6. What is the best oil for rubbing the varnish inside of passenger cars to reduce the surface to a dead finish?

7. What is the cause of varnish turning white on locomotive tanks, and how to prevent it?

Fraternally,

ROBERT McKEON, Secretary.

Removing Paint from Locomotive Tanks

Editor Railroad Paint Shop:

Referring to Mr. Johnson's inquiry on this subject in the July number: I have tried about all the different methods that have been recommended, or suggested, by the craft and find that the sandblast is the best where one has the appliances for doing this work. But since it is quite difficult, first, to get the apparatus rigged up, and, second, to procure a suitable place in which to do this kind of work, we have settled down to the old reliable process of removing the old paint with a plaster made of lime and caustic soda. We have also used twelve boxes of the "Sun Rise" lye or potash instead of the caustic soda in making our plaster, with good results. We have removed the old paint from upward of thirty tanks within the past two years. I slake my lime with cold water. To a half barrel of lime use twenty pounds of caustic soda dissolved in hot water. After sifting the lime, to remove all lumps, etc., put it in a tank about the size of a large barrel made of boiler iron, which is let about half way down in the ground. Then add your dissolved soda and stir thoroughly, adding warm water until it is of the proper thickness. Make up this plaster late in afternoon and let it remain in tub over night; you will find it will not be so likely to slide off the tank. Apply your plaster first thing next morning, which can be done in two or three hours by a laborer with a plasterer's finishing trowel, 4 1-2 x11 inches. If your plaster shows signs of drying too rapidly, sprinkle lightly with cold water. The plaster should be kept moist and remain on the tank from four to five hours. Then put your tank outside of shop and scrape the plaster off with a stiff scraping knife; take a shovel and gather up and put in trash car. Wash tank thoroughly with water from a hose, using a scrubbing brush over rivets and seams to remove all particles of lime, etc. Then put tank back in shop, allowing time to become perfectly dry before priming. I might say just here that for a primer I have found that Flood & Conklin's No. 1 surfacer with small quantity of Princes' metallic brown added is "hard to beat." Our tanks are quite large, each one holding from three to five thousand gallons of water. We can clean one of these tanks ready for priming at a cost of from $2.80 to $3.20. The cost of this work will vary somewhat according to the price paid for labor. We pay only 80 cents per day for labor here, while at another shop I was in charge of we paid $1.40 per day.

W. H. TRUMAN,
Columbia, S. C.

Cleaning Iron with the Sandblast

The writer has been interested in the sandblasting and painting by the bridge department of the Boston & Maine, of a large overhead truss iron bridge across the Merrimac River at Lawrence, Mass. This bridge is nearly 900 feet long, and, like most of its class, after long exposure, it was badly rusted; but the sandblast cleans it of old paint and rust at the rate of about one square foot per minute. If desired to make the cleaning more thorough, the nozzle of the blast is held nearer the work—within a few inches—when it leaves it as devoid of paint and rust apparently, as a new silver dollar. Held off a foot or two it does good work. It appears to be the ideal way to prepare the surface of iron bridges, or, for that matter, any rusted iron surface for repainting. A gasolene engine and compressor combined is installed near the bridge with the requisite reservoir for the air, and tanks of water for dripping on parts of the engine to keep it cool. This engine, once started in the morning, requires no one to remain with it to tend it, and uses about fifteen gallons of gasolene daily. Near the work are tanks of beach sand from which large hose with suitable nozzles lead to the work and thus is blown upon the iron at about 16 or 17 pounds' pressure, a large iron pipe conveying the compressed air out on the bridge where wanted. Six men began this bridge the first of May, which was a rainy month, only about a week of it being available for out-door work of this character, and they had it about completed July 23d. Time enough is taken to paint before night that which has been cleaned during the day so that it shall not again get rusty with the dew falling; and for this purpose, they were using with brushes, air painting not being practical for this purpose, Dixon's Graphite Paint, and if some sand gets into the undried paint no attention is paid to it as this is found to be not detrimental. This has now become the standard method of treating iron bridges on the B. & M.; and when one is completed the crew receives orders to proceed to another, perhaps in another State, whither they go with their apparatus loaded and with their boarding car, where the men eat and sleep, a cook accompanying them to take care of their needs in this regard.

This may at first thought seem an expensive process, but doubtless the excellent results obtained more than compensate for the outlay. It should be said that this work is not carried on in the winter months as freezing weather is not only not conducive to the best results in painting exposed iron surfaces, but it would also be fatal to the successful working of the apparatus where water and condensation from the compression of the air form an unavoidable part.

Railways will doubtless do well to look into this matter of preparing the iron surfaces of tanks and bridges for paint in this way, if they have not done so already.

NOTES AND COMMENTS.

As will be noticed, the official notice from Secretary McKeon of our next convention is in another column. The committees on some subjects lack one member, and in one case it will be seen that only one name appears. (Subject No. 4). This is owing to the difficulty in getting members to accept the parts assigned them in time; and calls to mind the ancient scripture. "And they all with one consent began to make excuse." Doubtless there will be no lack at the convention.

Mr. Frank Taylor, formerly with the Barney & Smith Car Co., Dayton, Ohio, and whose address is now No 1, Bodwell street, Hartford, Conn., is traveling representative of C. E. Mackey & Co., New York, operating the "Investors' Fund," a means of investment for idle capital, which is said to be "free from the dan-

gers which threaten all marginal investments in the stock market." Certificates are issued to investors in the same. It is hoped by "Frank's" numerous friends that he will find this new occupation more congenial and profitable than car painting.

It is said that Mr. G. R. Casey, who was the lamented M. L. A. Gardner's successor as Foreman Painter at the Atlantic Coast Line shops, Florence, S. C., is no longer with that road, but is connected with a small road in Florida.

Most of our members will remember with pleasure Mr. A. D. Keyes who has been a constant attendant at our conventions, representing Devoe & Co., and whose untimely and sudden death occurred early in June. Having seen nothing in the Digest for July in the nature of an obituary, we subjoin the following kindly sent us by Mr. D. A. Leittle:

Mr. Alfrade De Forrest Keys, Vice-President of the New Jersey Dry Dock & Transportation Company, died Sunday of this week in Elizabeth, N. J., from appendicitis. He was born March 9, 1848, at Danbury, Conn., and had been for many years in the employ of Messrs. Devoe & Co., and was well known in the railroad trade. He was a member of the New York Railroad Club, the Engineers' Club of New York, and of other social and technical bodies.

At last accounts (July 20) M. F. S. Ball, Foreman Painter, Altoona shops, Penna R. R., was off on a vacation at Stagg Island in Lake St. Clair. Guess he must have picked the place out last year while at our Detroit convention and on an excursion up there. Whether it is also "a stag party" we have not learned. At any rate, we trust the subject of "Terminal Cleaning" won't come up. Nor paint spraying.

We have read of and seen many glaring mispunctuations in signs, but the following, in a Massachusetts town not far from the "Athens of America," "takes the cake:"

"OYSTERS EAT, DRINK AND SMOKE HERE."

When the usually innocent bivalves form such habits as those what shall be said of the rest of the inhabitants?

It is said that orange shellac that has become blackened by contact with metals in any way in vessels in which it is kept, or is otherwise black and muddy, may be clarified by the admixture of a little oxalic acid in powdered crystals direct to the shellac, or previously dissolved in alcohol, and the whole agitated together occasionally. One man said he thus saved a barrel of shellac with thirty cents' worth of oxalic acid, bringing the shellac back to its orange tone, from the black state, without apparent injury to the product. It may also be filtered through cotton or filter paper, but this is a slow process. Shellac should always be kept in wooden, earthen or glass vessels and brushes with metallic bindings should not be allowed to long stand in it.

Attention is called to an article in another column regarding Mr. Furman's Sandpapering Machine which we hope the artist will be able to illustrate from the rather poor print accompanying the same. The article came to this office in the form of a private letter to the editor but too late for us in our June issue, and in the pressure of cares got overlooked in preparing the July matter. We deem it of sufficient importance to put before our readers in this issue. We met Mr. Furman at a recent convention and were impressed with his candor in talking about his device. For some time previous to this, however, we were impressed that some one would get up some such machine for not only sandpapering but also for rubbing with black pumice; and he has done both and was doing it while we were dreaming about it. This is a large item in the passenger car painting problem, necessarily so by the slow process of doing it by hand; and if Mr. Furman can accomplish a reduction here by his ingenious device his name ought to be added to the list of labor-savers, with which, as yet, the ranks of foremen painters are not overcrowded. Some attachment for cleaning car glass would also be a valuable addition, as this is a large labor item in big shops.

HOTEL COLUMBIA, BUFFALO.

The accompanying illustration gives a view of the Hotel Columbia, which well-equipped hostelry will be the headquarters of the M. C. & L. P. Association during our annual convention at Buffalo next month. Particulars of the accommodations to be afforded by the proprietors of this hotel will be found in the official notice of the convention, and we are assured that the members in attendance at the convention will be well taken care of.

"The railroads are beginning to shut down on extensive sign-writing, or advertising, on the sides of freight cars, the Illinois Central being the first to take a stand against the practice. Small muslin signs containing simple notices may be tacked on, but not over the car numbers."

The above is clipped from an exchange. The practice did not stop too soon and can be none too thorough.

"Lampblack dries better if it has been calcined. Sign painters sometimes do this. It also works better every day, and has more body. Saturate it with alcohol, and ignite the mass; let it burn as long as it will. This will consume all the grease, or oil, and not injure the black."

The above from an exchange is on the right track, but a better way is to buy the article already calcined and refined, if you do have to pay more for it. You can hardly afford to risk your insurance in turning your paint shop into a paint factory.

Life is said to be one grand struggle to keep at the top of the dirt. Any good housekeeper knows this is a fact. It is particularly true of those who have the care of passenger equipment. The Foreman Painter who has not awakened to it may as well sleep on forever. Those who have awakened will see that all corners, especially dark corners, and crevices and moldings are scrubbed clean with soap, pumice and water before varnish is applied, otherwise what was once a beautiful interior, will be buried beneath the accumulated grime of years of negligence and slackness and become a sad comment on the supposed efficiency of the man in charge.

The following is another evidence that Philadelphia is a quiet town. I once discovered a sparrow's nest under a coal car in Lawrence, Mass., but the following takes first prize:

BIRD'S NEST ON A CAR.

From the Philadelphia Record.

Passenger coach No. 4219 of the Philadelphia, Wilmington and Baltimore Railroad has a regular rider every day in a robin that is so deeply engrossed in maternal affairs that she doesn't in the least mind the rattle and roar of the train. Underneath the car, on a wide beam that supports a portion of the air brake, she has built her nest, and all her energies are bent upon hatching some blue eggs.

The car remains at West Chester every night, comes to Philadelphia in the morning, makes a trip to Norristown, returns to Broad Street Station, and makes its last run of the day to West Chester. The bird must have accomplished the work of building her nest during the brief stops made by the train at the towns to which it runs, but why it should have selected such a place in the beginning is the most surprising part.

The nest was discovered several days ago by a railroad man at West Chester. He saw the robin fly from beneath the car and made an investigation, the result of which rather astonished him. The members of the train crews that run the car are awaiting developments with almost paternal anxiety.

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

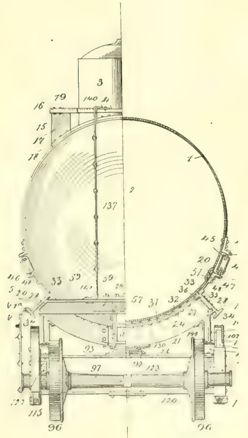
Tank Car

No. 678,597.

C. VANDERBILT, New York, N. Y.

The invention has relation to the construction of cars adapted to carry tanks for the transportation of oil, grain, coal, or the like, although many of the improvements hereinafter recited can be advantageously employed in cars used for other purposes.

The "tank" or "carbody," whatever it may be termed, is secured to the body-bolster without the interposition of any sills or bracings excepting the liner or cradle hereinafter described, thereby taking the weight of the tank and its load directly upon the body-bolster, which by reason of the fact that the body-bolster is low down on the truck brings the tank close to the center of gravity of the truck, and also by reason of the fact that the cross-section of the tank is circular and the bolster (in the preferred form) likewise or segmentally configured, the center of the bolster to which the center bearing or pivotal device is secured is placed low as compared to the ends of the bolster, the tank thereby being brought very low upon the truck and a considerable lateral extension of the bolster and direct supporting-surface for the tank are obtained. Not only is all of the strain of the support of the tank and its load taken primarily upon the body-bolsters, but their disposition on the arc of a circle enables the tank to be bodily placed below the end or cross sills, which construction has many manifest advantages.



The bolster acts as the main support for the tank, the bolster being tied longitudinally by side sills secured to the extremities thereof, the ends of the side sills being tied together by end sills. Intermediate bolsters, which are secured likewise to the side sills, and an intervening liner, to which is secured both the body and intermediate cross-bolsters and the side sills, are employed.

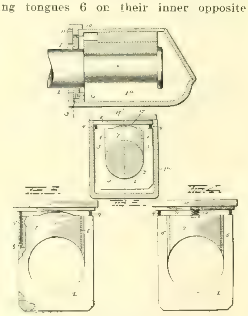
Another portion of the invention relates to the construction of the body-bolster, which according to the embodiment illustrated herein is made of one piece of metal struck up or forged into the desired shape, the general and essential features of which are that it is of a U or channel shape, with upwardly extending ears or flanges to directly or indirectly form a cradle for the support of the car body, to which flanges the tank may be or, as in the preferred construction of the cradle or lining is directly secured.

Dust Guard

No. 678,529.

JAMES TIMMS, of Columbus, Ohio.

The improved dust guard comprises a lower member 1, grooved in its lower end to receive a strengthening web 4 and provided with vertical parallel arms 5, having tongues 6 on their inner opposite



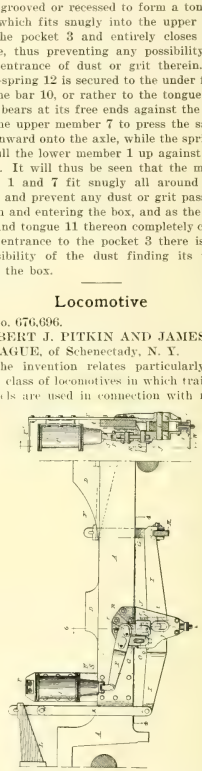
faces, which are disposed in grooves in the opposite sides of the upper member 7, so that the two members may slide freely on each other, but always maintain the same relation to the axle. The arms 5 are provided in their outer faces with grooves 8, in which coiled springs 9 are located, and said springs are secured at one end to the arms 5 and at their upper ends to a bar 10, which latter is of greater length than the width of the lower member 1 and grooved or recessed to form a tongue 11, which fits snugly into the upper end of the pocket 3 and entirely closes the same, thus preventing any possibility of the entrance of dust or grit therein. A bow-spring 12 is secured to the under face of the bar 10, or rather to the tongue 11, and bears at its free ends against the top of the upper member 7 to press the same downward onto the axle, while the springs 9 pull the lower member 1 up against the axle. It will thus be seen that the members 1 and 7 fit snugly all around the axle and prevent any dust or grit passing them and entering the box, and as the bar 10 and tongue 11 thereon completely close the entrance to the pocket 3 there is no possibility of the dust finding its way into the box.

Locomotive

No. 676,696.

ALBERT J. PITKIN AND JAMES E. SAGUE, of Schenectady, N. Y.

The invention relates particularly to that class of locomotives in which trailing wheels are used in connection with rela-



tively large driving wheels; and the object of the invention is to provide improved mechanism for at times shifting a part of the weight of the engine from the trailing wheels and the forward truck to the driving wheels.

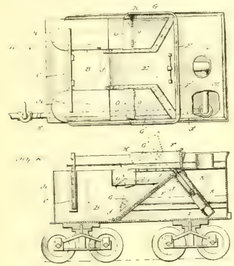
In carrying out the invention the inventors connect the springs of the trailing wheels and the springs of the driving wheels on each side of the locomotive by a system of links and levers and also connect the system of levers on one side of the engine with those on the opposite side by a cross bar. The main equalizing levers are provided with pivots or fulcrums arranged in hangers secured to the main frame, and these pivots are arranged to normally bear against seats in the hangers and to turn in these seats in such manner as to properly distribute the weight to the trailing wheels and the driving wheels and also to the forward truck for normal running.

Locomotive-Tender

No. 675,795.

EDWARD RYAN and OSCAR JOHNSON, of Clinton, Iowa.

This invention relates to improvements in locomotive tenders, the object of the invention being to provide means which can be readily operated from the forward



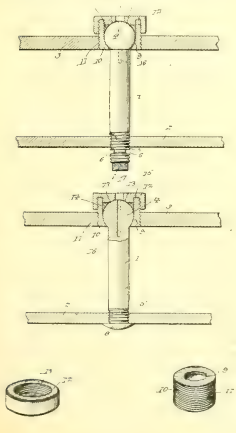
end of the tender, the cab of the engine, or at any other suitable or desired point for agitating the coal in the coal pit or moving the same forward, so that it can be readily reached by the fireman without having to enter the tender to agitate the coal or move the same forward.

Stay-Bolt for Steam Boilers

No. 675,935.

JOHN H. DAVENPORT, of Omaha, Neb.

One object of the present invention is to improve the construction of stay bolts for steam boilers and to provide a simple and comparatively inexpensive one of great strength and durability adapted to provide a movable connection between it and the outer sheet of a steam boiler, whereby all lateral strain on the head of the bolt will be prevented and a uniform



tensile strain insured, so that breakage of a bolt will be effectually prevented.

Another object of the invention is to prevent the inner and outer sheets of a steam boiler from increasing or decreasing the distance between them when they expand under pressure and when the latter is removed.

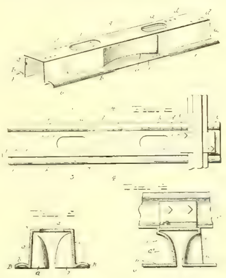
The invention also has for its object to provide a construction of this character which will admit of the employment of a telltale hole or bore for indicating breakage which may result from defective material.

Metallic Railway-Tie

No. 678,463.

JOHN C. FITZSIMMONS, of Pittsburg, Pa.

The invention is claimed as follows: A metallic railway tie of inverted U form having outwardly extending base flanges,



and having in its sides above the flanges depressions forming pockets for the reception of ballast, and provided in its top with a series of bolt holes permitting adjustment of the rails.

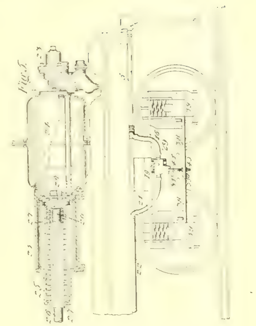
Air-Brake Mechanism

No. 676,850.

WILLIAM HENRY SAUVAGE, of Denver, Col., assignor to the Sauvage Duplex Air Brake Company, of same place.

The invention is specially intended for use on freight cars, its object being to regulate the braking force applied to the wheels of the car, so that said force shall be properly proportionate to the weight of the loaded car.

In the Westinghouse air brake system provision is made for using a braking force equal to 70 per cent. of the weight of the empty freight car; but when the car is loaded no automatic provision is made or can be made by the appliances in use for an extra braking force. The object of the invention is to overcome this difficulty, and the improvements embody means whereby when the car is loaded the extra weight on the spring-supported car body depresses the latter sufficiently to open a valve, whereby communication is effected between the train brake pipe and a pipe leading to the triple valve of an extra auxiliary reservoir and brake cylinder, the push rod of the brake



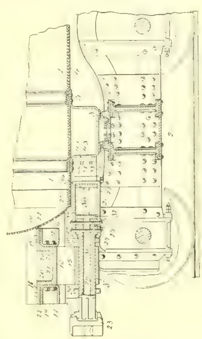
cylinder being connected with the brake lever in such a manner that an extra braking force proportionate to the increased weight given by the load may be applied to the wheels. When, however, the load is removed and the car is empty, the said valve is automatically closed, thus cutting off the extra brake mechanism from use, whereby only ordinary brake mechanism adapted for the empty car is utilized.

Draft-Gear for Railway Rolling-Stock

No. 678,801.

CORNELIUS VANDERBILT, of New York, N. Y.

The special improvement recited herein relates to a new and improved draft gear as applied to a tank car or its equivalent and which may be advantageously employed in other relations.



The main feature of the present invention, which may have application to other forms of cars, but which has especial virtues in connection with the construction shown and described, resides in dispensing with the usual connection of the draft rigging with the car framing and applying it to the body bolster or some such equiv-

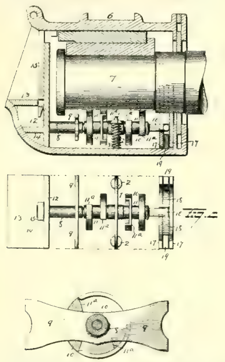
alent element of the car, and providing such arrangements that the primary or initial pull or thrust in either direction will be taken upon a spring or set of springs, which, after being compressed, will transfer the pull or push to the body bolster, and when the strain in every direction is abnormal the draft rigging is adapted to come in contact with a part of the end sills or other appropriate part of the car body, whereby the excessive or abnormal strain is taken from the body bolster and transferred to the car frame and the body bolster relieved therefrom.

Car-Axle Lubricator

No. 673,166.

HENRY GALLAGER, of Savannah, Ga.

The combination with a journal-box and an axle projecting thereinto, of a shaft yielding supported beneath the axle, lubricating-rollers on said shaft held

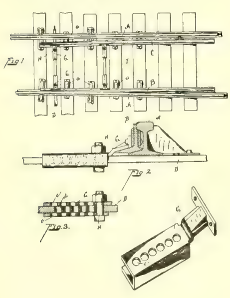


against the axle, a dust-guard connected to said shaft and held against the axle and a U-shaped plate carried by said guard to close the space below the same.

Adjustable Switch-Bar

No. 667,827.

CHARLES PARTINGTON, of Newport, Ky., assignor to the Weir Frog Company, of Cincinnati, O.



In combination with a switch-bar provided with a series of holes a given distance apart, a pair of channel-brackets adapted to be secured to the switch-rails, each channel being provided with a series of holes pierced through both members thereof, a greater distance apart than the holes in the switchbar, and locking-bolts passing through the channels and switch-bar and locking the parts to any adjusted position.

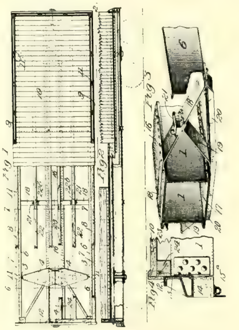
Underframing for Box-Cars

No. 678,573.

GEORGE I. KING, of Detroit, Mich., assignor to the American Car & Foundry Company.

This invention relates to a new and useful improvement in underframing, designed particularly, though not exclusively, for use in box-car construction.

The object of the present invention is to support the load of the car on a single girder-like structure, in which are included metallic members usually designated as the "centre sills" of the car. This single centre sill in addition to supporting practically the entire load of the car,



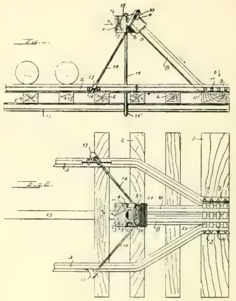
also forms struts for trussed structures arranged intermediate the bolsters, said trussed structures carrying some of the longitudinal sills or nailing strips. The longitudinally arranged box-girder sill practically terminates at the bolsters of the car, the members thereof extending beyond said bolster for supporting the draft rigging. An end sill is provided, to which the draft and side sills are secured, said end sill extending above the draft and side sills to form an abutment for the transversely arranged nailing strip at the end of the car, to which nailing strip or timber the end wall is secured.

Railway-Bumper

No. 676,630.

ALVIN C. McCORD, of Chicago, Ill.

In the preferred embodiment of the invention there is preferably employed two rails of the railroad track to serve as stops, as well as to divert the stress transmitted thereto from the bumping post, the

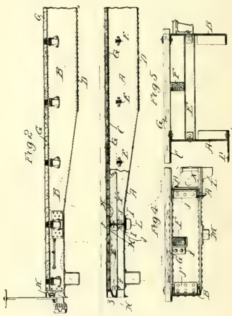


said rails being converged at the ends thereof and suitably fastened to supporting rods or standards which slant upwardly and are in engagement preferably with the bumping post. I preferably employ in the preferred embodiment of my invention a suitable stiffening rod, preferably extending lengthwise of the track, which rod or standard is adapted to receive thrust occasioned by the bumper post and distribute the same along the track. I provide suitable means for holding the said stiffening rail in position along the track, so that the same will not become disarranged.

Underframing for Railway Rolling-Stock

No. 678,958.

GEORGE I. KING, of Detroit, Mich., assignor to the American Car & Foundry Company.



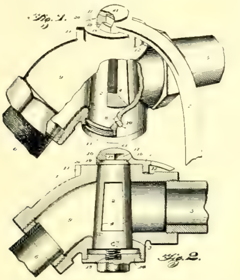
In an underframing for cars, the combination with centre and side sills consisting of metallic beams continuous longitudinally of the car and made deepest at their middle portions, body bolsters and end sills for tying the centre and side sills together, an elongated cover-plate running lengthwise of the car secured to the centre sills, and a bottom cover-plate extending throughout the deeper portions of the said centre sills and secured thereto.

Angle-Cock for Train-Pipes

No. 676,598.

ALONZO M. APPLEGATE, of Reynoldsville, Pa.

The invention is an improved angle cock for the train pipes of railway air brakes, one object of the invention being to effect improvements in the construction of the angle cock whereby when the same is closed before uncoupling the hose between the cars the air pressure in the hose is automatically relieved.



A further object of the invention is to effect improvements in the construction of the angle cock and the handle or key used to turn the plug thereof, whereby dust and water are prevented from entering the space formed between the bore of the shell and the tapered plug when the latter is depressed against the tension of its supporting spring.

Railway-Car Brake

No. 671,113.

ERNEST F. MEYER, of Waverly Park, N. Y.

The invention consists in the combination with a supporting-truck having front and rear pairs of wheels rigidly connected, of a horizontal carrier-frame vertically movable between

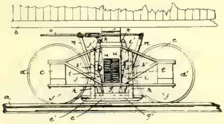
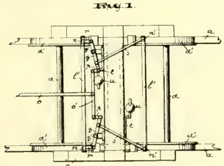


Fig. 1.



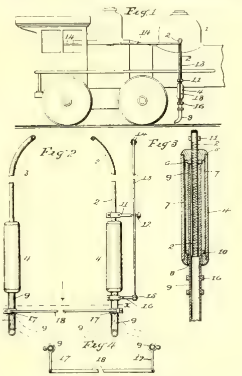
said pairs of wheels, brake-shoes longitudinally disposed over the rails and each having at its upper edge a dovetailed rib lying in a corresponding groove in the carrier-frame, chains attached to the ends of said shoes and connecting them to the truck, pairs of vertically-disposed levers having upper and lower members pivoted at their opposite ends to the truck and carrier-frame, respectively, and forming at their meeting ends a toggle-joint, the lower member having an extension projecting beyond said joint, and a system of levers for applying draft to said toggle-joint levers.

Adjustable Sand-Pipe

No. 678,682.

D. E. OLIVER, of Bovina, Miss.

All sanding devices known are defective and fall short of their full purpose in that they do not follow the curves and turns in a railway, but swing off to the sides thereof as the engine takes the curve or makes the turn and shoot the sand away from the rails instead of upon them. It is of vast importance that the curves be sanded as well as the other portions of the track. It is therefore to accomplish this purpose, to overcome such



defects and shortcomings, and to provide means for putting the position of the discharge end of the sand pipe under the control of the engineer that the invention is intended.

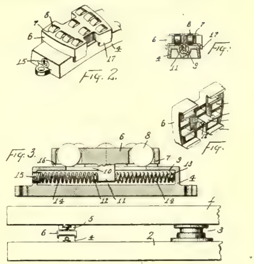
The inventor claims: The combination, with the screw-threaded sand pipe having a lock nut, and the pipe coupling vertically adjustable thereon, of the screw-threaded chute having a nut within the coupling and vertically adjustable therein, the chute being turnable in the coupling and having a curved discharge end, and means for turning the chute.

Side Bearing for Cars

No. 675,977.

WINFIELD S. ROGERS, of Boston, Mass.

In a side bearing, the combination, substantially as set forth, of a roll cage consisting of a plate having through it a series of mortises contracted at one face of the plate, a cylindrical roll disposed in each mortise and having a diameter



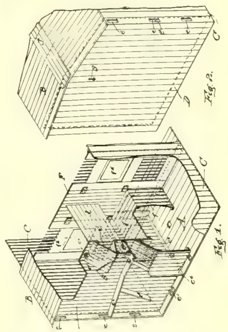
greater than the thickness of said plate and greater than the contracted dimension of the mortise containing the roll, a side bearing provided with a longitudinal chamber and with a slot extending from said chamber to the face of the bearing, a lug projecting from said cage through said slot and into said chamber, a plug screwed into one end wall of said chamber, bosses formed upon said plug and said lug and on the end wall of said chamber opposite said plug, and helical springs disposed within said chamber and engaging said bosses.

Ventilator-Refrigerator Car

No. 675,960.

CHRISTIAN E. LUCAS, of Atlanta, Ga.

The claim reads: In a ventilator refrigerator car, the combination with the sides, floor, roof and ends of a false end near and parallel to the end of the car,

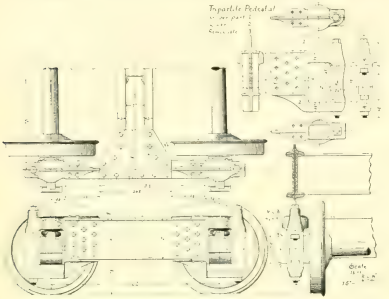


a pocket in said false end open at its top and bottom ends, valves controlling said openings and a casing extending along the floor over the drawhead bolts and communicating with the lower opening in said pocket and the cargo space.

The Trans-Siberian Railway, begun in 1892, is to be completed by 1908. About 3,000 miles of track have been laid and 2,000 more are necessary to complete it.

Truck with Tripartite Pedestal

We have received from Mr. R. C. Wright, of the firm of Stebbins & Wright, patent attorneys, a drawing of a car truck, made of structural steel shapes. The feature of this truck is its "Tripartite Pedestal," which, as its name implies, is composed of three pieces so arranged that the withdrawal of two bolts releases a block, which forms the outside jaw of the pedestal, thus permitting a pair of wheels to be quickly and easily removed, without the car having to be jacked up. The end sought seems to be very satisfactorily gained, the casting



appears to be light and strong, and the simplicity of the design is apparent. The truck transoms are made of 3x15-in. steel channels, which at the ends sweep round with a curve of 9 3-4-in. radius and join a similar channel, which forms the truck side, between the backs of which are secured the webs of two portions of the tripartite pedestal. A cover plate on top of transoms and truck side makes the whole construction rigid. An axle box spring, resting upon the box, fits into the upper portion of the pedestal. About half of the spring is covered, and there is no chance for it to get out of place. This class of design (structural steel shapes and facilities for expeditiously removing defective wheels under load) is gaining in favor.

Books Reviewed

INDUSTRIAL OPPORTUNITIES.

A great many books are published and a great many enterprises are undertaken with the avowed purpose of "supplying a long felt want." A railway company is, however, an exception to this rule, if rule it may be called. Unlike many other organizations, one of its chief functions is to create a demand, for which it is itself in reality the supply. The Delaware, Lackawanna and Western Railroad, therefore, in pursuance of this business principle has caused its industrial department to issue a little book of 300 pages, entitled "Industrial Opportunities."

This book deals with every town on the line, showing population of each, its distance from New York and from Buffalo, its railroad facilities, its leading industries, its leading shipments, its rate of taxation, cost of labor, rent of houses, how lighted, whether it has water works or not, principal source of power, approximate cost of steam coal, approximate value of lands, etc. The book describes vacant lands for factories, available for manufacturing purposes. In the introduction the aim of the Lackawanna Railroad is set forth as follows: First: To give assistance to manufacturers in the selection of the most favorable sites for their industrial enterprises. Second: To help cities, towns and villages along the line to expand and broaden through the location of new industries; to point out the advantages of this line in the mining regions of New Jersey and Pennsylvania and the agricultural districts in the State of New York.

A page is devoted to each town, and all are arranged in alphabetical order. For example, opening the book at random, we find that the town of Shickshinny, N. Y., boasts of 2,000 inhabitants. It is 178 miles from New York, and 298 from Buffalo. Its railroad is the Lackawanna. The leading industries are the manufacture of woolen yarn, rollers, handles, straps, mine props and railroad ties. Its principal markets are in Scranton. The rate of taxation is .014. The cost of labor there is $1.25 per day. The rent of an ordinary eight-room house is $6 per month. It has both gas and electricity for lighting purposes. It possesses water works. Its principal power is steam, and the approximate cost of anthracite steam coal at this point is, for pea $2.80, and for buckwheat size $1.80 per ton. Under "special inducements," we are told, "vacant building, 40 x 60 feet, two stories high, well built and lighted, with power that would suit parties looking for place to manufacture electrical supplies, can be rented at a low rate and immediate possession given. This is a desirable place for a paper mill, as it is surrounded by abundance of wood for making pulp and has plenty of pure water." The Lackawanna is, of course, not in any way responsible for the name of the town.

This is a sample of the ready and useful information which may be had from a perusal of the pages of this book. The Lackawanna is not particularly concerned in blowing its own trumpet in publishing this book. It scatters information about others for the use of the public, which will, no doubt, in time bring grist to its own mill. The railroad is to be congratulated on its "book of reference" for towns along its line.

The Industrial Department of the Lackawanna Railroad, in charge of Mr. William B. Hunter, with headquarters at 26 Exchange Place, New York City, by whom copies of the book will be forwarded on application.

A HAND BOOK FOR APPRENTICED MACHINISTS.

Published by the Brown and Sharp Manufacturing Company, Providence, R. I. Price 50 cents.

This little book of 127 pages, edited by Mr. Oscar J. Beale, now in its second edition, was issued primarily for the use of apprentices in the Brown & Sharp Company's shops, but as there appeared to be some call for a book of this description, it has been placed upon the market. The work does not go into mathematical details, but merely gives the information necessary for a young man serving his time at the machinists' craft. There is an introduction and eleven chapters. Chapter I deals with centering and the care of centers; Chapter II takes up turning, reading a drawing, measuring, and how to lace belts; Chapter III is a recapitulation and explanation of the ordinary signs and formulæ used in arithmetic and simple mensuration; Chapter IV is concerned with drilling, counterboring, tapping and correct cutting speed; Chapter V treats of the screw and its parts; Chapter VI gives instruction in figuring gear speeds; Chapter VII is on figuring pulley speeds; Chapter VIII goes into change gears in screw cutting; Chapter IX defines an angle, teaches the setting of a protractor and working to an angle; Chapter X includes circular indexing, straightline indexing and subdividing a thread, and Chapter XI is cautionary, touches upon later points, and like the good old fashioned sermon, says a few words of wisdom "in conclusion." Some useful tables are added, such as the decimal equivalents of parts of an inch. Metric measures and their British and American equivalents. Decimal equivalents of millimeters, and the size of tap drills for United States Standard threads. A comprehensive index closes the book. Throughout the work is profusely and clearly illustrated, and it is just the sort of book that an apprentice, eager to master the rules and overcome the difficulties of his day's work, would find most helpful.

The book will be sold through various book dealers, it can also be procured from hardware and supply firms, or it will be mailed on receipt of the price by the Brown and Sharp Manufacturing Company, of Providence, R. I.

The Chicago Grain Door Co. has recently received the following orders for grain door equipment: 800 Chicago Great Western, box; 800 Intercolonial of Canada, 1300 Illinois Central, 250 Norfolk & Western, 300 Chesapeake & Ohio, 600 Canadian Northern, 2,000 Chicago, Milwaukee & St. Paul, together with 5,000 "Security Dock Brackets" used in conjunction with outside doors.

PERSONALITIES

Joseph O. Osgood has been appointed chief engineer of the Central of New Jersey, to succeed J. H. Thompson, assigned to other duties.

J. M. Daly, late Superintendent of Transportation on the Lackawanna, and before that for many years on the Illinois Central, is now at Moncton, New Brunswick, where he has gone to organize the car service and fast freight departments of the Intercolonial Railway.

Henry W. Toothe, for the past eleven years with the Midvale Steel Co., has accepted a position in the railroad department of the Magnolia Metal Co., with office in New York City.

J. H. McConnell, formerly superintendent of motive power of the Union Pacific, has been appointed manager of the works of the American Locomotive Company at Pittsburg.

Frank W. Morse, superintendent of motive power of the Grand Trunk Railway, has been appointed third vice-president of that system, with direct jurisdiction over the transportation, motive power and car departments. He will also act as assistant general manager. Mr. Morse went to the Grand Trunk as superintendent of motive power in April, 1896, having been previously for seven years master mechanic of the eastern division of the Wabash at Fort Wayne, Ind.

J. W. Lally has been appointed supervisor of tracks on the thirteenth division of the N. Y. C. & H. R. Road, with headquarters at Buffalo.

F. A. McArthur has been appointed acting superintendent of motive power and machinery of the Kansas City, Fort Scott and Memphis, vice W. A. Nettleton, resigned.

A. E. Mitchell, heretofore superintendent of motive power of the Erie, has had his title changed to mechanical superintendent.

Earl H. Fitzhugh, formerly general manager of the Vermont Central, has been appointed assistant to the president of the Southern Pacific, with offices at San Francisco.

J. B. Elliott, master mechanic of the Canadian Pacific at Carleton Junction, Ont., has been appointed master mechanic of the same road at Montreal.

P. M. Kilroy, for many years in charge of the air brake department of the St. Louis Southwestern, and a former secretary of the Air Brake Association, has been appointed general foreman of the car department of the St. Louis Southwestern at Pine Bluff, Ark., to succeed T. H. Osborne, who recently resigned to accept a similar position with the Northern Pacific at Portland, Ore.

W. D. Robb, master mechanic of the Grand Trunk at Toronto, has been appointed acting superintendent of motive power, with headquarters at Montreal, vice Frank W. Morse, appointed third vice-president.

Harvey L. Preston, master car builder of the Chicago, St. Paul, Minneapolis & Omaha road at Hudson, Wis., for the past 18 years, died of heart failure at his home at that place on June 28.

Milton Player has been made division master mechanic of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan., vice G. T. Neubert.

Olof Hoff has been made engineer of structures of the New York Central & Hudson River, having charge of bridges, buildings and water supply.

P. S. Blodgett, the new General Superintendent of the New York Central & Hudson River Railroad, was for several years previous to 1890, local Freight Agent of the Lake Shore & Michigan Southern at Chicago. For two years subsequently he was Superintendent of the Eastern Division at Buffalo, and then for four years was Assistant General Superintendent. He held the position of General Superintendent of the Lake Shore & Michigan Southern, from which he recently resigned to go to the New York Central & Hudson River, since March, 1896.

Charles H. Taylor has resigned as Eastern Sales Agent of the Thornburgh Coupler Attachments Co., L't'd., Detroit, Mich., and until further notice all Eastern business should be transacted direct with the Detroit Office.

Thomas Prosser of New York, was recently elected president of the Standard Acetylene Lighting Company. He was also appointed sales agent of the same company.

W. W. Turlay, who recently resigned the position of secretary of the Steel Tired Wheel Company, is now treasurer of the Latrobe Steel Company and the Latrobe Steel and Coupler Company, of Philadelphia.

F. W. Haskell, who has been, since 1898, vice-president of the Carborundum Company, Niagara Falls, N. Y., was on July 5, elected president of the same company. Mr. Haskell was educated as a civil engineer and was for a period of eight years in railway service, beginning in the engineering department of what is now the Chicago, St. Paul, Minneapolis & Omaha.

Mr. John S. Chambers has just been appointed Superintendent of Motive Power of the Atlantic Coast Line, with headquarters at Wilmington, N. C. Mr. Chambers is 43 years old, and began his railroad career in 1886 as a machinist in the shops of the Wabash, St. Louis & Pacific. Since that time he has held respectively the following positions: General Foreman, Kansas City & Northwestern; General Foreman and Master Mechanic, St. Joseph Terminal; Master Mechanic, Illinois Central; Superintendent of Motive Power, West Virginia Central & Pittsburg; Master Mechanic, Buffalo Division Lehigh Valley; Master Mechanic, Central Railroad of New Jersey, from which position he recently resigned.

Walter D. Crosman who recently resigned the editorship of the *Railway Master Mechanic*, of Chicago, has left the field of journalism for the more lucrative one of railroad supplies,—having accepted an appointment as the Western representative of the Gold Car Heating Company. Mr. Crosman's long and intimate association with railroad mechanical problems and his very extensive acquaintance among railroad men make this connection a valuable addition to the force of this progressive and enterprising company.

Frederick Brotherhood has been appointed Manager of the Foreign Sales Department of the Railroad Supply Company with headquarters at their New York store, 106 Liberty street.

Convention Exhibits

The Employer's Time Recorder had a sample clock at the M. M. and M. C. B. conventions at Saratoga last June. In order to register "in" or "out" it is not necessary for a workman to carry a key. All he has to do is to turn a little handle up or down. A glance at the face of the instrument always shows exactly who has passed, and whether he is in or out, a glance, therefore, will assure a time-keeper, manager or proprietor whether or not the majority of the men are in or not. A foreman can tell whether a particular man who is good at certain kinds of special work is in or out, without the necessity of going through the shop to find him. The system protects the employee, in that it is absolutely accurate in the record of his time and the manager or proprietor may himself check off the pay-roll, or gain any other information desired.

The Pearson Jack Company, also had an exhibit showing its car replacing jacks, with which railroad men are familiar, also the Pearson King-Bolt clamp which is on the market as a new device for wrecking. This company has a factory in Canada as well as at Boston, Mass., and is doing a rapidly increasing business abroad as well as at home.

The Pressed Steel Car Company recently shipped 70 large capacity pressed steel hopper ore cars for the Great Southern of Spain Railroad, not on their own wheels, but carefully packed in parts ready for shipment on the White Star line Steamer Georgic. An engineer from the Pressed Steel Car Company will superintend the erection of the cars on their arrival in Spain.

The cars themselves are of 80,000 pounds capacity; and, when in service, will be the largest cars in use on any Spanish Railroad. In some respects they differ materially from American cars. For instance, one car in ten is equipped with a shelter box for the brakeman or guard. These boxes are built of wood on the end of the car and are so constructed that the guard has an unobstructed view of the portion of the train under his care. Other minor portions of the car, such as the hand brake apparatus, etc., differ from American standards, but in the main, the cars are similar to cars built for ore roads in this country, by this company.

Record *of* New Equipment

Ordered during the Month of July 1901

CARS

Ordered by		Class.	To be built by
Alabama Gt. Southern	100	Box.	Am. Car & Fdry. Co.
American Cot. Oil Co..	100	Tank.	" " " " "
American Gas Co....	3	Trolley.	" " " " "
Amer. Ref. Tran. Co..	100	Refrig.	" " " " "
California Northern..	6	Coaches.	Pullman Co.
Canada Northern.....	100	Box.	Crossin Car. Mfg. Co.
" " ...	500	Box.	Illinois Car & Equip. Co.
Canada Southern.....	500	Freight.	" " " "
Cane Belt...........	120	Flat.	Am. Car & Fdry. Co.
Central of Georgia....	250	Coal.	" " " " "
Chicago & Alton......	1	Cafe.	Pullman Co.
" " ...	150	Hopper.	Am. Car & Fdry. Co.
" " ...	250	Gondola.	" " " " "
" " ...	400	Steel.	Pressed Steel Car Co.
Chicago Gt. Western.	200	Stock.	Pullman Co.
Cin., Ham. & Dayton.	250	Box.	Am. Car & Fdry. Co.
" " " ...	250	Box.	Barnes & Smith Co.
Cleveland Cliffs I. Co.	1	Private.	Pullman Co.
Colorado & Southern.	50	Box.	Am. Car & Fdry. Co.
Cline Stock Car Co....	1	Freight.	Middletown Car Works
Crucible Steel Co.....	4	Freight.	Youngstown Car Co.
Edwin Gould, Esq....	1	Private.	Pullman Co.
Erie	1,000	Coal.	Pressed Steel Car Co.
Hastings Express Co..	3	Express.	Pullman Co.
Illinois Central.......	300	Refrig.	Am. Car & Fdry. Co.
" " ...	500	Box.	" " " " "
Intercolonial..........	250	Box.	Crossin Car Mfg. Co.
Kan. & Tex. Coal Co.	3	Freight.	Am. Car & Fdry. Co.
Kerley Bros.	10	Freight.	" " " " "
Langhorn, Mr. C. B..	16	Freight.	" " " " "
Lake Shore & Mich. S.	25	Ballast.	Rodgers Ballast Car Co.
Macon, D. & Sav......	200		Am. Car & Fdry. Co.
" " " ...	5	Passenger.	" " " " "
Manhattan Elevated..	400	Trucks.	" " " " "
Mexican Central......	30	Freight.	Allison Mfg. Co
Michigan Carbon Wks.	1		Am. Car & Fdry. Co.
Mobile, Jack. & K. C.	8	Passenger.	Harian & Hollingsw'th Co.
Mobile & Ohio.......	700	Box.	Am. Car & Fdry. Co.
" " ...	550	Gondola.	" " " " "
" " ...	200	Vent. Box.	" " " " "
" " ...	50	Furniture.	" " " " "
N. Y. Cent. & H. R. R.	200	Flat.	Haskell & Barker Car Co.
Ocilla & Irwinville...	1	Coach.	" " " "
Pennsylvania	750	Box.	" " "
" ...	1,250	Box.	Pressed Steel Car Co.
Phila. & Reading....	500	Steel.	" " "
Robinson, C. W., Esq.	2	Freight.	Am. Car & Fdry. Co.
St. Lawrence & Ad...	1	Coach	Pullman Co.
St. Louis & San Fran..	11	Box.	Am. Car Fdry. Co.
Texas Central........	10	Ballast.	Rodger Ballast Car Co.
" " ...	20	Flat.	Am. ar & Fdry. Co.
" " ...	2	Coaches	Pullman Co.
" " ...	1	Express.	" "
Toledo, St. L. & West.	50	Freight.	Am. Car & Fdry. Co
" " " ...	50	Box.	" " " " "

LOCOMOTIVES

Ordered by		Class	To be built by
Baltimore & Ohio....	10	Switcher.	Richmond Loco. Works.
Boston & Albany....	24	Consol	Schenectady Loco. Wks.
" "	6	Passenger.	" " "
Bis., W. & Gt. Falls	1		Baldwin Loco. Works.
Butte, Anac. & Pac..	1		" " "
Canadian Northern...	5		" " "
Canadian Pacific.....	10		Schenectady Loco. Wks.
" "	8	Consol	American Loco. Co.
" "	4		Canadian Loco. Works.
" "	1	Shay.	Lima Loco. Co.
Chicago Gt. Western..	20	Compounds	American Loco Co.
Chicago, Ind. & L....	4	Freight.	Brooks Loco. Works.
" " "	3	Switcher.	" " "
" " "	2	Passenger.	" " " "
Chi. Un. Trans. Co...	4	Consol	American Loco Co.
Elgin, Joliet & East...	11	Consol	Baldwin Loco. Works.
" " " ...	3	Switches.	" " "
El Paso & Northes'n..	1	Shay.	Lima Loco. Co.
Ind. Ill & Iowa......	11		Brooks Loco. Works.
Mexican Central......	15		American Loco. Works.
" "	4	Switchers.	Pittsburg Loco. Works.
Minn., St. P.& S.S. M.	4		Schenectady Loco. Wks.
Missouri Pacific......	25		Brooks Loco. Works.
Prince Edw. Island...	2		Canadian Loco. Works.
St. L., K. C. & Col...	3	10-wheel.	Baldwin Loco. Works.
Southern Indiana	2	Passenger.	" " "
" "	2	Switch.	" " "
West Vir. Short Line.	2		Manchester Loco. Wks.

Castings for Resisting Heat

The castings used about a plant in positions where they are exposed to intense heat, generally burn out in a short time, frequently causing delay and sometimes necessitating shutting down of the entire plant for repairs. A mixture of iron is now being made that will give the users of this class of castings a longer service after installation—from 33⅓ to 100 per cent. more wear at a small increase over the prices of gray iron castings. Tests have been made in furnaces employing intense heat, where a casting of ordinary mixture has been rendered utterly useless in 20 days' time, while a casting of the heat resisting mixture, doing the same daily service, lasted a period of 62 days, thereby saving the user the renewals as well as the loss in the output of material being manufactured. The mixture referred to is in use in the manufacture of castings by the Davis & Ludwig Foundry Co., 240 Root street, Chicago.—Iron Trade Review.

Universal bearings of the Universal Car Bearing Company of Chicago have been specified on 1,500 cars to be built by the American Car & Foundry Company for the Mobile & Ohio. Plans are maturing for increasing the capacity of the various works of the American Locomotive Company from 1,700 to 2,000 locomotives, per annum. Toward this end the directors have appropriated $500,000. The annual capacity of the Schenectady plant will be raised from 425 to 1,000 locomotives.

"Are You a Buffalo?"

The story comes to us of the performance of a large bull buffalo, who had been afforded commodious quarters by the New York Zoological Society in its Bronx Park property. The enclosure was fenced about with some of the "Page" woven wire fencing, similar to that used beside the tracks of so many of our railway lines. The bull did not like this style of fence, but made no remarks about it. His motto just then was, "Deeds Speak." He studied the fence quietly for some time, and then walked slowly and stealthily away from it, a dozen yards or so. He then turned about suddenly, and without warning, charged, head down full speed at the woven wire. He flung himself upon the fence in the name of the whole suffering brute creation which is often basely "cribbed, cabined and confined" by this fence, at the bidding of man. He plunged into it, and the fence yielded! Struggling on, he made a deep sag in that fence before it remembered Newton's Third Law of Motion, which states emphatically that "action and reaction are equal and opposite." Armed with this immutable law of nature the fence recovered its wind and elastically swung on the snorting beast. It forced him back, out, and up and hurled him away (as ye fire a bullet with flat trajectory,) and cast him upon the vile earth from whence he had sprung, unwept, unhonored, and half stunned. The buffalo gathered himself up with what dignity he had left, while the fence took some of the lumbago out of its back. The bull buffalo was, however, heard to remark sorrowfully to himself as he walked away, "So, that's the kind of fence, is it?"

American Locomotives in France

Ten American locomotives are being put together at Arles, France, for use on the Lyons-Mediterranean Railroad. Not that the thrifty Frenchmen have any intention of using our engines as a regular thing. M. Baudry, chief engineer of the road, frankly says that French builders want to study them and adopt for French builders the points in which they are superior. Different conditions make the test severe. American engines haul heavy trains, French engines haul light ones. The powerful machine may not prove economical in the lighter work, but on its own road-bed and at its own task it is the best in the world, by far the most efficient per ton-mile of weight hauled.—*New York World.*

RAILROAD DIGEST

Formerly The Railroad Car Journal

ENTERED AT THE NEW YORK POST OFFICE AS SECOND-CLASS MATTER.

Published on the Tenth Day of the Month by
THE CAR JOURNAL PUBLISHING COMPANY
At 132 Nassau Street, New York

Annual Subscription Price: United States, Canada and Mexico, $1.00; other Countries in Postal Union, $1.50

EDWARD A. PHILLIPS GEORGE S. HODGINS, Editors

Vol. XI SEPTEMBER, 1901 No. 9

The "Railroad Paint Shop"

Since August, 1893, a department bearing the above title has been an important and interesting feature of this periodical, and it is with considerable regret that announcement is made that this department is to be discontinued with its publication in this issue. The consideration which has led up to the decision to take this step is based upon several vital reasons, the principal one of which is that in order to make the Railroad Digest entirely what it aims to be—a synopsis of the broad field of railroad engineering and mechanical literature—space can ill be afforded to adequately represent a mechanical sub-department which is technically valuable and of special interest to a limited number of railroad men, and those a small minority of our readers who now—since the evolution of the Railroad Car Journal into the Railroad Digest—represent every branch of the science of railroading, and every grade of railroad official from president downward. In short, it is felt that the space hitherto devoted to the presentation of reading matter, mainly for the edification of the Master or Foreman Painter can be more advantageously used in enlarging and elaborating the Digest of current technical literature for the benefit of a much wider clientele.

While thus emphasing the propriety of this action the editors cannot refrain from a brief expression of regret at this severance of official relations with the Master Car and Locomotive Painters' Association, which throughout the long connection has been surroun led by pleasant and gratifying personal intimacy with many of its members.

This announcement would be decidedly incomplete did it not include a well merited tribute to the excellent ability and faithful devotion of Charles E. Copp, who, for eight years, has so efficiently edited the columns of the "Railroad Paint Shop." The ability thus manifested has been too widely acknowledged to need repetition here; his devotion has been more to the *cause*—the uplifting of his fellow craftsmen and their useful organization—than in seeking the rewards of a facile pen. The M. C. & L. P. Association has in him one of its stauchest pillars, and may well be, as it is, justly proud of him.

The last duty in penning this article is to relieve Mr. Copp of any possible charge of egotism which might be inferred from the appearance of his own portrait on a larger scale than the preceding ones in the long continued series of the "M. C. & L. P. A. Portrait Gallery." The responsibility for this larger engraving of the features of the retiring editor rests with the publishers of the periodical, and is to be taken as a meagre effort of theirs to pay a parting compliment to "Brother Copp."

Locomotive Dispute in Great Britain

It will be remembered that Sir Alfred Hickman, in his statement regarding the performance of American locomotives in Burma, referred to the latest official reports of the Burma and Assam railways to maintain his contention that they are less efficient than the British. In the Burma report for the first half of last year it is stated that the height of the fuel fence on the tenders of the Baldwin engines had to be increased to enable them to hold sufficient coal to last between coaling stations, and that these engines consumed 35 1-2 per cent. more coal per train mile and 23 1-2 per cent. more per car mile than the English engines. The latest official Assam report, dated the 10th of April last, contains the statement that the Baldwin engines take 24 per cent. more coal and 25 per cent. more oil than the English engines.

In an article by our contemporary, *Locomotive Engineering*, a resume of which appeared last month, the claim of Sir Alfred Hickman that the American engine burns more coal per unit of work than does the British is admitted, while the contentions of inferior finish, where finish is essential, and greater cost for oil, which are levelled at American engines, are combated.

In this connection it is interesting to note the outspoken and manly remarks of the *Railroad Gazette*. An editorial writer says: "We have talked with English inspectors who have been watching the building of locomotives in this country, and we think that their testimony has been that our boiler work is below the British standard. It is commonly known that American locomotives sent abroad have to be taken into the shop to have leaky seams doctored. We do not consider it 'patriotic' or 'American' to deny this well-established fact. It is more patriotic, as well as businesslike, to see that it does not happen again."

In the recent "locomotive dispute" in Great Britain, as it has been called, Lord George Hamilton said that the "Americans got a footing in India during the great engineering strike in England some years ago; they gave satisfaction, their locomotives were cheap, and were promptly supplied. When locomotives were recently required in a hurry for Burma, British engineers were "full up," and evidently could or would not make any push to secure the contracts. The Americans, on the other hand, although equally busy, took ways and means to do the work, and supply the locomotives required, and they are never disposed to rest and be thankful with a limited output, as the conservative Britisher is very often."

A London correspondent, writing to the press on this side of the Atlantic, says: "There is one serious disadvantage from which British manufacturers suffer, to which Sir Alfred Hickman does not refer, and which, perhaps, explains why America is able to run away with orders which Britain ought to have. We here, for all our free trade in raw material and merchandise, have no free trade in labor. We are fettered by the modern trade unionism, which is a tyrannical and dangerous system of protection. The average English artisan regards labor-saving tools as his enemy. He will not encourage his employer to resort to them, as men do in America, and if an intelligent workman agrees to work a new tool which saves time and cost of production, his union steps in and forbids him."

Evidence, however, is not wanting which indicates that the attitude of the British trade unions is changing on this important matter of output.

The American Locomotive

The utterances of Mr. S. R. Callaway, president of the American Locomotive Company, which recently appeared in the Philadelphia *Saturday Evening Post* (a resume of which appears elsewhere in our columns) as to the output of American builders, and the probable increase in foreign trade, make very satisfactory reading.

Mr. Callaway draws a clear and necessary distinction between the American-type locomotive, and the American-made locomotive. The latter is not, in the broad sense, an American locomotive, because in nearly every case, such engines have been built in accordance with foreign specifications. The very great difference in the systems of railroading which obtain here, and in Great Britain, France and other countries,

makes accurate comparison between foreign and American engines exceedingly difficult, if not impossible.

The weight of opinion is, however, that the British engine is more economical in the use of coal per ton-mile, than is the American engine. There is a reason for this, but the fact remains. Mr. Callaway says that the main advantage of the American engine is its immense power, its capacity for hard and continuous work, and that this advantage cannot be applied in the countries where the systems of railroading differ as widely from ours, as do those of Great Britain and France. What may be done, when American engines designed and built to fully meet the conditions imposed in foreign service, have been sent abroad, is a matter upon which we may reasonably look with hope.

As it is now, however, a very important fact is before us. Freight rates in the United States, we are told, average 40 per cent. less than those of Europe. With the estimate of the British locomotive already in mind, it is fully in order to ask, does the American locomotive deserve all the credit for the freight rates we enjoy?

It now appears that the large car, with its low ratio of dead weight to revenue load, is a very important factor in producing this result. The large yards in the United States, the facilities for handling freight in large quantities, and the admirable system of freight car interchange, in vogue with us, must also have a very decided influence on the total cost per mile, which determines the freight rate.

The British engine may do more with a ton of coal, than our engines will do, and though an American engine, given one ton of coal, may take fewer tons of freight over one mile of track than an English engine will take, yet the total cost per ton-mile is less on an American railroad than it is on a railway in the United Kingdom. There is nothing paradoxical in this statement. The American engine has been built to handle large cars and long trains, in which dead weight has been reduced to its lowest terms. The English engine would not handle the same tonnage over our grades; but, per ton of coal, what it does haul is done with greater economy. Fuel consumption is an engineering problem, low freight rates are the result of economical management.

The long train of large cars fully loaded, reduces the expenditure for American roads, not by fuel economy, but for the reason, that for a given tonnage, fewer trains would be hauled by us, than would be required by our British cousins. The cost in train crews, locomotive handling at terminals, comparative cheapness in locomotive first cost, harder and more continuous work done by them, comparatively low cost of switching, and the round of close economics—most of them in the operating department—systematically practised all the way through, by American roads, combined, give us our freight rates 40 per cent. below those of Europe.

The American locomotive is a very satisfactory machine, and suits our requirements in an admirable way, and it does pretty much what we expect it to do, though it may not wholly suit outsiders. In comparing ourselves with foreign countries, we find that the total cost, to a railroad, for moving one ton of freight over one mile, is lower with us than it is abroad. To get that figure, on which depends our satisfactory freight rates, we have, in reality, to take the algebraic sum of a number of plus and minus quantities. In the United States, the sign before the coal account figure, for our engines as compared with the British, at present appears to be, plus, though the total showing of American railroad operation, when so compared, is minus, and satisfactorily so.

English East Coast Passenger Locomotive

By Frank C. Perkins.

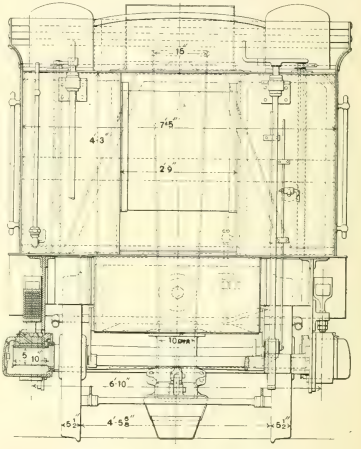
The English engines built by Mr. Wilson Wordsell, locomotive superintendent of the North Eastern Railway Company, are well known throughout the world as among the most successful and satisfactory locomotives in service at the present time. The engine described and illustrated by the accompanying drawings was designed and built by him at Gateshead especially for working the heavy East Coast Express Passenger traffic between York and Edinburgh.

These engines are six-wheel coupled with a four-wheel bogie in front. The coupled wheels are 6 ft. 1 1-4 in. in diameter. The cylinders are placed outside the frames, have a stroke of 26 in., and a diameter of 20 in. The boiler has a total length of 15 ft., and a diameter of 4 ft. 9 in. outside; the fire-box being 8 ft. long with a grate heating surface of 23 square feet, while the working pressure of the boiler is 200 pounds per square inch.

These engines are designed to work trains equal to twenty passenger coaches loaded, and to run 124 1-2 miles at 53 miles per hour without a stop. The weight of the train behind the tender will vary from 350 to 375 tons. From the above data it will be seen that the work these engines are required to do is of the heaviest and fastest in English service. Gradients of 1 in 96 for about five miles and others of 1 in 150, 1 in 170, and 1 in 200 are met with on different parts of the line on which they are designed to run.

Stephenson's link motion is used, the diameter of the piston rod being 4 in. and the length of the slide block 1 ft. 3 in., while the length of the connecting rod is 10 ft. 6 in. between centres.

As will be noted from the dimensions on the accompanying drawings of the engine and tender, the diameter of the driving



SECTIONAL VIEW OF TENDER.

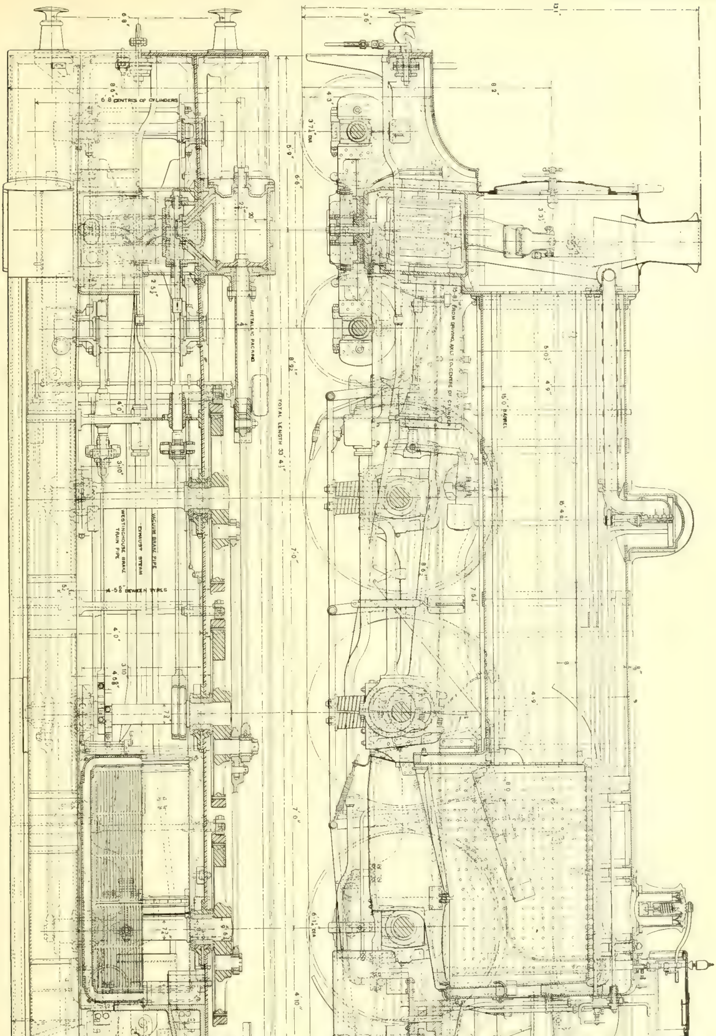
wheels is 6 ft. 1 1-4 in., the bogie wheel having a diameter of 3 ft. 7 1-4 in. The thickness of all tires on the tread is 3 in., while the width of the tires is 5 1-2 in. The axles are of steel, with a wheel seat 9 in. in diameter and bearings of 8 in., the diameter at the centre being a quarter of an inch smaller.

The centres of the axle bearings are 3 ft. 10 in. apart, the length of the bearings being 9 in. and the length of the wheel seat 6 7-8 in. The distance from the centre of the trailing wheels to the back buffer plate is 4 ft. 10 in.

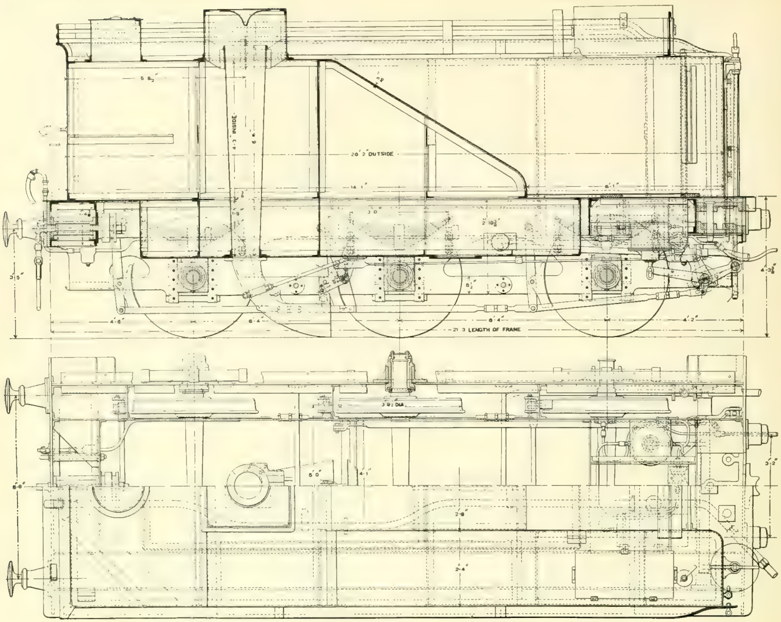
The bogie axle is also of steel, with a wheel seat whose length is 7 1-4 in. and diameter a quarter of an inch more than its length. The bearings are 9 in. long and 6 in. in diameter, while the distance between centres is 3 ft. 7 in.

All the crank pins are of steel, those on the driving wheels are, for connecting rod, 5 in. in diameter, and 5 in. long, for coupling rods, 5 3-4 in. in diameter and 3 1-2 in. long. The other crank pins for the coupling rods are 3 in. long and 4 1-4 in. in diameter.

The steel boiler is constructed of plates 9-16 in. in thickness,



PASSENGER LOCOMOTIVE, NORTH-EASTERN RAILWAY OF ENGLAND.



SECTION AND PLAN OF TENDER, NORTH-EASTERN RAILWAY OF ENGLAND.

and the distance from the centre of boiler to rail is 8 ft. 2 in. The tube plate is of copper. The thickness of smoke-box tube plate is 1 in., butt joints being used with rivets of 2 in. pitch and a diameter of a trifle less than an inch. The firebox is of the best steel and has a breadth outside at the bottom of 3 ft. 11 in. The thickness of the front, as well as the back plate, top and sides, is 5-8 in., while the copper stays are 1 1-8 in. in diameter and 4 in. apart. The inside firebox is of copper with an inside length at the bottom of 7 ft. 3 1-2 in., and an inside breadth at the bottom of 32 1-2 in., the distance from the top of the box to inside shell being 1 ft. 4 15-16 in. The inside depth of the firebox at the front is 5 ft. 8 in., and at the back it is 4 ft. 8 in.

The boiler tubes are of steel, numbering 204, while the length of the tubes, between tube plates, is 15 ft. 4 1-8 in.

The height of the stack from rail is 13 ft. 1 in. The total heating surface of the tubes amounts to 1638.86 square feet, while that of the firebox is 130 square feet, making a total heating surface for firebox and tubes 1768.86 square feet.

The total weight of the engine and tender is more than 100 tons, the former weighing 62 tons 8 cwt., and the latter 38 tons 12 cwt. The weight of the engine is distributed over the various sets of wheels as follows: On the bogie wheels, 16 tons 3 cwt.; the leading wheels, 11 tons 19 cwt.; on the driving wheels, 19 tons 7 cwt., while on the trailing wheels the weight supported is 14 tons 19 cwt.

The tender has a tank capacity of 3,164 gallons and a well capacity of 537 gallons, making a total of 3,701 gallons of water which may be carried. This tender is fitted with a water scoop and has a total coal-carrying space for 10,000 pounds.

The tender frames inside are constructed of material 1-2 in. in thickness, while the outside frames have a thickness of 7-8 in. The distance between the inside frames is 4 ft. 1 in., and the distance between the outside frames is 6 ft. 2 3-4 in.

The total length of the engine is 33 ft. 4 1-2 in., and the general design may be noted in the accompanying plan and elevation. The tender is also shown in the engraving.

Tweedledum or Tweedledee

A correspondent writes us quoting part of Rule 3, Section 1, as follows: "The end of the car upon which the brake staff is located shall be known as 'B' end, and the opposite end shall be known as 'A' end. Where there are the two brake staffs on same car, the end toward which the cylinder push rod travels shall be known as 'B' end." He asks which would be the "B" end of a car with two brake staffs and no air brake? He says a case of this kind came under his notice not long ago.

This problem reminds us of the question we once heard asked, "Which kind of a railroad would you rather travel on, one which has a turn-table but no time-table, or vice versa?"

The car described is obviously not contemplated by Rule 3, Section 1, and no definite answer can be given. Such cars are now few and far between, and are destined eventually to disappear. A practical solution of the difficulty would be in such a case to paint the letters A and B, one on either end of the car, and "let it go at that."

"Oh," said the eagei rusher after business, as he bounded into the editor's sanctum with a joyous laugh, "Will you take machinery in exchange for advertising?" "Yes," replied the calm-eyed man of the pen. "We would take all the wheels in your head, but our space is limited."

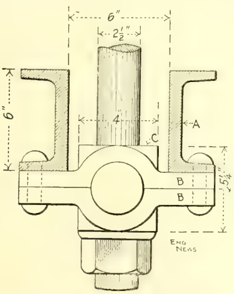
The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

The Accident to the Brooklyn Bridge

Engineering News, August 8, 1901, p. 90.

Mr. Wilhelm Hildenbrand, who was assistant to Colonel Roebling and who made the calculations and plans for the whole superstructure of the Brooklyn Bridge, writes to the *News*. He says there was of course some cause for the breakage of the nine suspender rods. All the long suspenders consist of wire ropes. They are attached to the floor beams by means of two adjustable screw rods, which go through a plate riveted to the underside of the bottom chord of the floor beams and are held in place by nuts. This makes practically a rigid connection, but there is enough elasticity in the long ropes to allow for the oscillations of the bridge. The short suspenders, which are ranged along for a length of about 375 feet in the center of the span, consist of solid steel rods 2 1-2 inches in diameter. Nine of these rods broke. They were made of mild steel, having an ultimate strength of 75,000 pounds, and an elastic limit of at least 45,000 pounds. He says, "I know that the actual quality of the steel surpassed the requirements of the specifications." The attachment of these rods to the cable is the same as that for the rope suspenders, they being bolted to the lugs of a 5 x 5-8 inch steel band, which tightly clamps the cable. The connection of



these rods to the floor beams was designed so that the lower end of the rod goes through a trunion, which revolves in a trunion plate, which is riveted to the underside of the top chord of the floor beams. The rod passes through a hole in the trunion block, and is held in place by a nut bearing against the under side of the trunion. The axle of the trunion is parallel with the floor beam, and the trunion block oscillates between the two channels which form the top chord of the floor beams. This arrangement allows the lower end of the suspender rods to swing transversely to the floor beam and to move forward or backward as the trusses expand or contract without causing any bending strain in the rod. The length of the shortest rod is about two feet. The greatest observed motion of the trusses in the center of the span was 7 inches, that is 3 1-2 inches each, though 8 inches had been allowed for.

Occasionally the cable bands did not offer sufficient resistance, and shifted on the cable, or were intentionally shifted to accommodate the direction of the suspender rods. In this manner the original adjustment became displaced, and it is reasonable to assume that the rods which broke may have swung 7 or 8 inches out of plumb in place of 3 1-2 inches, which would at once make the temperature stresses five or six times larger than they would be under normal conditions. There is also not sufficient room between the top chord channels for so much motion. In the case supposed the suspender would bear against the edge of the channel and would bend. It was also observed that the trunions were covered with rust, which must have caused considerable frictional resistance to the free oscillation of the rod, and thereby increase the bending stresses. Lastly, it could be observed that the bridge is subjected to strong lateral vibrations, which would cause constantly reversed bending strains in the rods as soon as they became rusted in the hole of the trunion block, instead of moving freely in the latter. In the opinion of the writer it is probable that a combination of all the circumstances mentioned must have happened, which easily could have produced sufficient tension in the rods to break them. He concludes by saying there is plenty of strength in the cables, which are the true backbone of the bridge. Under the supposition that the structure is in a perfect state of preservation it is capable of accommodating safely all the traffic it bears now without restricting the trolley cars to run at specified intervals, or without giving reason for apprehending danger or alarming the public at every slight mishap that may occur.

An Engineering Committee on Rail Sections

Railroad Gazette, August 23, 1901, p. 591.

The members of the American Society of Civil Engineers are asked to vote on the appointment of a committee to consider (among other things) a possible modification of the American Society rail sections. It will be the duty of this committee to ascertain whether or not any changes are desirable in the disposition of the metal in that admirable series of sections. It is true that no change in the sections ought to be made except after most careful consideration, and no change should be made unless the reasons for it are powerful. Probably 70 per cent. of all the rails rolled in the United States in 1900 were rolled to the society's sections. Since these sections were contrived conditions have changed. Rails are being finished at a lower temperature than formerly, this seems to have developed the fact that the flange of the American Society section is relatively too thin. Furthermore, the process of re-rolling worn rails seems likely to become an important element of economy, and a thicker flange will better fit the rail for rerolling.

At its March (1901) meeting the American Railway Engineering and Maintenance of Way Association received a report from its committee on rails. This committee said: "If

all rails hereafter are to be rolled at a lower temperature we think the section should be modified, and that the sooner the change is made the better for all concerned."

Mr. W. R. Webster, a member of the committee, said in the discussion on the report: "In any of the methods of rolling the flange is the troublesome feature, as it cools more rapidly than the head. This can be overcome to a large extent by putting more metal in the flanges of the heavier sections in order to carry the heat longer and allow the work of rolling the head at a temperature low enough to produce the tough, good-wearing steel of the old lighter rails."

Among the objections to the appointment of a committee by the American Society of Civil Engineers to consider the rail section modification question, it has been urged that the society has no evidence before it that either railroads or mills have found the present sections unsatisfactory. Two answers to this objection are given—(1) That the Board having no machinery for receiving such information it can only reach that body through the ordinary channels by which knowledge is conveyed from man to man. (2) The one modification that seems to be needed is the result of very recent conditions.

Improvement in Steel Rails

Scientific American, July 6, 1901, p. 1901.

This article is by Mr. W. G. Irwin. The Carnegie Steel Company of Pittsburg, is one of the largest manufacturers of steel rails in this country. A few months ago a number of the leading roads gave notice that their future orders for rails would carry with them a proviso that the rails should be treated after the manner suggested by the American Society of Civil Engineers; the Carnegie Company agreed to do as required. In some of the experiments it was found that several of the improved methods, curtailed the output and this latter feature was not desirable. It was generally agreed that in order to accomplish the desired improvement it would be necessary to roll the rails at a lower temperature than the usual white heat. There was danger of this reduced heat working to the deterioration of the product by reason of physical changes during the rapid cooling. It has been found that by reducing the temperature of the unfinished rail before it passes through the finishing roll, the product is brought up to the standard of hardness which the railroads are now demanding. In the new process as conducted at the Edgar Thompson mills the rails are allowed to cool from 30 to 40 seconds before being passed through the third or finishing set of rolls. The unfinished rails are shoved out under the rolls onto the cooling table, with the head of the hot rail placed next to the flange of the one which preceded it. Being thus placed, the flange which is thinner, cools at about the same temperature as the head, the heat being equalized, so that the flange is not in a different condition from the thick head in the final rolling. The new process was independently discovered by Mr. Thomas Morrison, superintendent of the Edgar Thompson (Carnegie) works and Mr. Julian Kennedy, a mechanical engineer of Pittsburg. An application for patent was made by each on the same day. Both have now combined their interests, and the new process will be known as the Kennedy-Morris patent for rolling steel rails, and it will be used exclusively by the Carnegie Company. Chemical tests show that with steel rails rolled under the new process with slower radiation of heat and working the steel cooler, a loss of carbon is prevented, resulting in greater hardness. The delay in completing the final process of rolling gives greater tensile strength in the physical test. The miscroscope shows a finer and more even fiber.

Park Avenue Tunnel and the N. Y. C. Railroad

Railroad Gazette, August 16, 1901, p. 576.

The improvement of the present condition of the tunnels by which trains enter the Grand Central station, in New York City, is a matter which has long had much serious consideration from the officers of the New York Central Railroad Company. The assumption that those officers are either indifferent to public comfort, or without practical ideas on the subject, is as unjust as it is silly. Improvement may be made along two different lines. It may be ventilated, or it may be worked by motors. The first would be temporary, the second would be permanent, but the latter would be very costly, and would take several years to carry out. The *Gazette* professes to guess at the solution of the problem. It says:

"Any operating officer will readily see that it would be impracticable to run a suburban electric service into the 42d street head house, along with the through trains. The great frequency of movement, which is a vital point of any such plan, would alone require a special set of tracks. The suburban traffic will have to be handled by means of electricity in trains having a motor on each car. Probably at some point the suburban tracks will be dropped under the yard, and a loop will be made, around which these electric trains will run without switching. Taking the local trains out of the yard would leave room to care for the through cars there, instead of hauling them back to Mott Haven, and so the engine movement in the tunnel would be greatly reduced. If it should still be found that the tunnels were disagreeable, it would then have become possible to consider the use of a fireless locomotive of some kind."

Graham's Keyless Rail Chair

Engineering Times (London), August, 1901.

This keyless chair has been designed in view of the demands made by the heavier types of locomotives and rolling stock at the present high rate of travelling and consequent increased oscillation, the effects of which upon the existing keyed chair have been displayd in more or less disastrous forms due to the liability of the keys to become displaced or to

drop away altogether. The chair illustrated is formed of two symmetrical parts, each consisting of a base plate, the upper part of each of which is wholly on one side of the rail, and has a complete jaw for holding the rail and a tongue which passes under the base plate of the other part producing when set in position and pinned, a self-locking effect, as well as a substantial and permanent grip of all but the rail head.

Wasteful Railway Construction

Railway World, June 15, 1901, p. 664.

The primary point at which there can be waste in the business of transporting persons and property is by the creation of facilities in excess of the demands of traffic. This does not mean that there is necessarily such waste when construction of railway lines is undertaken in advance of the existence of traffic in certainly remunerative quantities. It has been the function of American railway builders to act as the pioneers of industry, and it is not improper that within the limits imposed by conservative estimates of potential development, the traffic-producing power of new territory should be anticipated. With all the latitude implied by this generalization, and the most liberal application of the principle involved to situations which have, necessarily, to be studied singly, there can be no question that there have been many times, in the past, in which the production of railway facilities has proceeded, within the United States, with quite unjustifiable rapidity.

Locomotive Equipment, Appliances and Related Matters

Conditions of Service Important

Railway and Engineering Review, August 10, 1901, p. 538.

Referring to Mr. S. R. Callaway's article, the *Review* says, regarding the foreign trade, that locomotives must be built with a view to the service expected of them. To get the best results local conditions must be thoroughly understood. The American type can undoubtedly be adapted to every variety of service, and comparisons can only be fairly made when the engine has been designed especially for the particular work. The combination of so many locomotive building plants into one company will render it possible to study and meet foreign conditions in a way which has never been done before. Mr. Callaway's statements regarding the advantages of American builders when they come to prosecuting foreign business earnestly, are correct.

American Locomotives and Foreign Buyers

Saturday Evening Post, July 27, 1901, p. 3.

Mr. S. R. Callaway, president of the American Locomotive Company, and former president of the New York Central and Lake Shore Railways, gives some figures relative to the locomotive building, and related matters. Among other things, he says: "Last year there were turned out of the American shops 3,153 engines, the largest number ever built in the history of the country. The production showed an increase of 680 locomotives, or 27.5 per cent., over the production of 1899, when the building record was also broken. Last year there were sent abroad 505 machines. In 1899 we sent 514 abroad; in 1898, 554; in 1897, 386; and in 1896, 309.

American-made locomotives are run to-day in England, Canada, France, Spain, Japan, Russia, India, Sweden, Mexico, Brazil, Cuba, Egypt, South Africa, and elsewhere. With the exception of the recent complaint from England, I do not believe that fault has been found anywhere with the locomotives furnished from here, and I doubt very much whether such English criticism as there has been, will have any influence in keeping American-built machines out of the foreign markets.

Forty locomotives only have been sent over there, and they have been in use only two years. And they were all built under English specifications. That is to say, though they are American-built locomotives, they are not in the broad sense American locomotives. This is a very pronounced distinction. It holds good with almost all of the locomotives now in use in foreign countries, with the possible exception of those in South and Central America and Mexico. There the American-type locomotive is in use, in contradistinction to the American-built locomotive that has been sent to most of the other countries.

It is unfortunate that, owing to the existing conditions in Europe, the American-type locomotive has not found a place there. The system of railroading in Great Britain, France, and the other countries across the water is entirely different from our system here. There trains are light and facilities for handling freight are, comparatively speaking, small.

They have no such vast yards as we have in this country, and no manager would dream of making up freight trains of the length and weight that are common with us. Therefore the main advantage of the American locomotive, its immense power and its capacity for hard and continuous work, cannot be applied. In consequence, there can be no real competition between our machines and those made abroad. If there were, the foreign locomotive would stand no chance whatever, as our engines show an economy for each ton moved that is unapproached by any other type.

"It is this fact that gives us, here, freight rates that are on an average 40 per cent. lower than those that prevail in Europe. It is the same in passenger rates. Both freight and passenger movements are effected in America at a figure that no European railroad has been able even to approximate, notwithstanding the much lower cost of labor abroad. With all their advantage, both in point of power and speed, the American locomotives are more economical in operation than the best type of the foreign-built machines. Their first cost is less, and they cost less for repairs, fuel and oil. With very much higher-priced men in the cab, they cost very much less for labor in proportion to the amount of work they perform. Their life is probably not so long as that of the foreign-built machine, but this is due to the fact that they are not coddled. It is the policy, and experience has shown it to be a profitable policy, of the American railroad manager to work his locomotives constantly."

American Locomotives in England

American Engineer and Railroad Journal, August, 1901, p. 251.

In view of the great difficulty in making a comparison between two classes of locomotives when all concerned use their utmost endeavors to get the real facts it is not at all strange that the American locomotives on the Midland Railway of England are reported to be wasteful. The reported extra working costs over the English engine in the same service for six months are: Fuel from 20 to 25 per cent., oil 50 per cent., and repairs 50 per cent.

As to oil and repairs nothing can be said without knowing more than we know about the conditions, but with reference to fuel we believe that there is as much as 25 per cent. variation to be expected in the adjustment of the front end arrangements to suit English coal, plus a lack of personal interest in the success of the American engines which was to be expected, because of the bitter criticisms of the policy of buying the engines in this country. No one expected the American engines to come out ahead. It would not do at all to have them beat the English machines, even if they could do so under favorable circumstances—which we decidedly doubt. This is an oportunity, however, for a most interesting locomotive study, though it may not be made. It suggests a question which American designers would profit by satisfactorily answering, viz.: Why do English engines, in general, do such good work with such small heating surfaces?

There is no profit in blindly defnding one's own practice in the face of an opportunity to improve it. This affair is merely an interesting example of American methods whereby an emergency was quickly and satisfactorily met. As a comparison it is equivalent to matching our rough and ready practice of years ago with the polished and highly finished methods of a conservative and steady development under the most highly concentrated attention the locomotive has ever had. It is utterly impossible to compare present representative American and English locomotives for reasons too well known to require explanation.

We confidently believe, however, that it would be profitable for an American road to import an English engine and make a study of its operation under conditions adapted to its capacity.

The *American Engineer* quotes from London *Engineering*: In the paragraph it appears that while the latter thinks that the superiority of British engines over American in the matter of fuel economy is probable, it may be that British engineers lay too much stress on this item of expenditure. The London paper believes, however, that American competition in engineering industry is an extremely serious question with which British engineers must deal in a most strenuous manner.

American Locomotives in Great Britain

The Engineer (London), August 9, 1901, p. 139.

The fourth paper contributed by "A Locomotive Engineer" takes the ground that the point of view has a great deal to do with the conclusions drawn. In the first place he deals with what he calls the structural differences between the two makes of engines. The bar frame is a matter of settled practice in the United States. It was, however, a survival of the old original locomotive frame adopted by Bury in his early designs, as exemplified in the engine "Liverpool," built in 1834 for the Leicester and Sirannington Railway, a form of frame abandoned in Great Britain in favor of the plate frame, as

soon as the rolling of plates of sufficient dimentions was established. Bar frames have some advantage in lending themselves readily to the attachment of cylinders, and there may be other minor advantages, but these are purchased at a serious loss in the sacrifice of from 5 to 6 inches in the width of the firebox and grate. England having presented the bar frame to America, he asks what is left in respect to general design which can be regarded as fundamental, or which the British locomotive maker is precluded from adopting, if the conditions under which the engines are to work, admittedly require it. It is obvious that any material that can be used with satisfactory results by American locomotive builders can be equally well employed by English manufacturers. In the matters of cylinders the practice in America is almost universally in favor of outside cylinders, but this cannot be claimed as a distinctive feature of American engines seeing that at least 50 per cent. of British-made engines have also outside cylinders. Whenever locomotive users prefer outside cylinders English makers are in a position to accommodate them. If again, the roadway is such as to require a certain specific limit of weight per axle, English makers can provide the number of wheels required. They can couple them or leave them uncoupled, furnish equalizers if desired or can apply bogies in front or at rear just as well as Americans can. In fact, anything that is done in the United States, in the matter of engine construction can be done in the United Kingdom.

The difference between American and English methods of working, and what is considered as of importance in each country is roughly exemplified as follows:

What is the desirable size of boiler, all depends on the point of view. "If," says the writer, "I was an engine-driver working a heavy train on a bad night, with wind and weather and fuel against me, and likely to have a few extra coaches or loaded wagons thrust upon my already fully loaded engine, by an uncontrolled traffic department, I should be a strenuous advocate of the "cannot-be-too-big-a-boiler" theory. If I were a locomotive superintendent, liable to be hauled over the coals by my board of directors, for the higher cost of the engines to start with; and, secondly, for the extravagance of my working expenses in fuel and repairs; I should, in that case, specify dimensions for the boilers more in acord with the agreed duty for which the engines are wanted, and I should, as a duty to my engine-drivers, see to it that the traffic department adhered strictly to the train-load rules."

British vs. American Locomotives

Indian and Eastern Engineer (Calcutta), July, 1901, p. 2.

The trade in British locomotives and railway carriages has been encouraging. The Japanese railway companies with few exceptions have discarded American locomotives in favor of those of British manufacture, merely using up, but not replenishing, their stock of the former, as they have experienced so much trouble from their boilers. "It is only one or two of the smaller railway companies, and the Hokkaido Railway, whose orders for locomotives are still placed in the United States, and for two reasons—cheapness and dispatch. For example, specifications were recently issued for locomotives for the Hokkaido Railway, for which British manufacturers were allowed to tender, but both the limit of time and the price obtainable were insuperable obstacles to the order being given to the United Kingdom. During 1900 thirty locomotives were ordered from British factories, an order for twenty-four of them valued at £66,000 ($320,100.00) being placed in November. Two of the four sleeping cars which are in use on the Government Railway came from home and two from the United States. The former are found to be much better and to give greater satisfaction. While it is probable that those required for future use will be constructed in Japan, the United Kingdom will benefit by supplying the fittings, such as wheels, sole bars, buffers and springs, which are not made there. The Formosan Railway last year ordered six locomotives from the United Kingdom to be delivered at Kelung, and steel and other materials for bridgemaking. To save duty the bridges are made at Osaka, and thence sent on to the island.

American and English Locomotives

The Engineer (London), July 26, 1901, p. 100.

"L. H. F." writes that he considers Mr. Rouse-Martin is correct in pointing out that American practice gives a locomotive greater reserve power than is usual in England. The American-built Midland engines have about 10 per cent. more heating surface, and were designed to give a greater maximum tractive effort. If tested with equal train loads, although the American engines would be more efficient from the traffic point of view, the English engine would be working under conditions more favorable to a low rate of coal consumption. The American engines were designed for a pressure of 180 lbs., but are operated at 160 lbs. He quotes Mr. Rouse-Martin as saying that the American engine builder aims at large reserve power. To this end valves are set with less lap than in England, this uses steam less economically, but the locomotives can be considerably overloaded by the traffic department in case of an emergency. In America the locomotive is regarded as an appliance for handling traffic with certainty and despatch, rather than as a machine for the economical consumption of coal. The writer says he has reason to believe that during the late coal famine in London the American Midland engines proved very valuable in handling trains 10 per cent. heavier than could be taken by the English engines. Midland Railway traffic conditions may render reserve power unnecessary, in which case the American engines could be rated higher than the English engines, and in any case in tests which are to show the comparative coal consumption of trainloads should not be equal, but should bear the same proportion to the maximum capacity of the respective locomotives.

American and English Locomotives in Egypt

Railway and Locomotive Engineering, August, 1901, p. 341.

In view of the criticisms our engines abroad have been subjected to recently, the following extracts from the report of Mr. F. H. Trevithick, locomotive superintendent of the Egyptian State Railways, is interesting and evidently fair: "The equipment of American make now in use is twenty locomotives, 300 wagons and nine machine tools. The twenty locomotives that are in use are of the freight type, and of similar weight and power to the engine we are in the habit of using on these railways. They have been manned by drivers and firemen of Egyptian nationality only, and inasmuch as they have already run an average of nearly 70,000 miles without having entered the workshops for general repairs, they have earned for themselves a satisfactory reputation as regards design and quality of material.

"The workmanship of these locomotives, with the exception of the working parts, is rough, and far short of the finish that is considered desirable by European engineers. The expense incurred in neatly finished portions, other than working portions, is very considerable, and goes far to account for the difference of cost between the American and English make of locomotive.

"The make of American and English locomotives differs so widely that it does not follow that two engines, one American and one English, of similar weight and power, and equally good in design and quality of material, should give the same good result in a strange land, where for many years the working staff has been accustomed to the use of the latter type. In introducing a new type, intricate details have to be simplified to suit the capacity of the mechanic, and the latter trained to the new conditions, and thus it was that time and attention had to be bestowed on these twenty engines before they settled down satisfactorily to their work. On the score of coal consumption I cannot speak with authority, as these engines have been engaged in comparatively light traffic, but I am inclined to think that their rate is high. These two conditions in a country like this, where the mechanic adapts himself slowly and unwillingly to changes, and where coal is expensive (25s. a ton), must ever be important factors when comparing the utility of the English and American locomotive for use in Egypt."

American Locomotives in Jamaica

Railroad Gazette, August 16, 1901, p. 69.

A correspondent, signing himself "R.W.," writes the *Gazette* regarding the recent trial of English and American engines on the Jamaica Railway. Under the same conditions the American engines beat the English by over seven minutes. The engines from this country were built by the Rogers Locomotive Company. They were constructed in 1895, and are ten-wheel, two-cylinder compounds. The cylinders are twenty and thirty-one inches in diameter, with twenty-six inch stroke. The driving wheels are fifty-inch diameter. Weight on drivers 102,000 pounds, on truck, 30,000 pounds. The line upon which they are used, extends from Kingston westward to Montego Bay, 113 miles, over the high central portion of the island. On this line grades and curves are combined, the former at places are continuous for several miles and are from 130 to 176 feet per mile, and the curves are mostly 18 degrees (319 feet radius).

"The arrangement for lessening curve friction in the Rogers engines consists of a radius pin in the truck frame 5 inches back of the rear truck axle, and only 44 inches forward of the center of the front driving axle. The center pin proper rests in a plate at the truck center 14 x 24 inches, its face being inclined from each side to the center at an angle of 1 in 16. The lower end or face of the center pin is of a corresponding shape, with lateral room to allow the front wheels of the truck to move 6 inches in a lateral direction from their central position, or as much as is necessary in passing the curves. The drivers, therefore, follow the line of rails of the curve without any side forces from the truck of consequence, and the engine passes the curves with about as little friction as if its total wheel base was only that of the drivers." This driving wheel base is 12 feet. The incline of the face of the truck center plate is only enough to keep the truck in its central position while running on a straight line. It, however, allows the truck to adjust itself to the curve with little tendency to pull the front end of the engine with it. Means were provided for ample lubrication of the truck center plate and pin.

[The success of these American-built engines is no doubt due to the fact that they were intelligently designed to meet known conditions existing in the country they were intended for. That is a point upon which it is almost impossible to insist too strongly in every case where our own and foreign engines are being compared.—EDS. RAILROAD DIGEST.]

American Locomotives in India

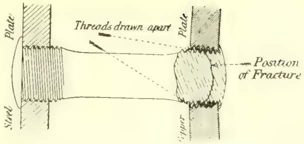
Railroad Gazette, August 9, 1901, p. 565.

The *Journal of the Board of Trade* (British) contains a report from the locomotive superintendent of the Oudh and Rohilkhund Railway, on the working of ten Baldwin engines supplied to that line last year. After describing the changes made in the engines to suit them to local requirements and the chief defects which have shown themselves, he concludes: These ten engines have been working passenger trains running at thirty to thirty-five miles an hour and goods trains running at twenty miles an hour, chiefly the former, and they have done their work well. They steam capitally, and are remarkably good starters; they get away from a station with fifty-five loaded coaches, equal to about 1,300 tons, with the greatest ease. They are a little higher in coal consumption than our new class "B" engines. They are easily repaired, but repairs have to be kept up as, if not, they will go to pieces sooner than our other engines would. They do not, as far as I can see at present, cost more than other engines, and I am very much satisfied with them."

L. & Y. Ry. Locomotive Boiler Explosion at Knottingly, England

Mechanical Engineer (London), August 10, 1901, p. 197.

The official Board of Trade report in describing the cause of the boiler explosion, which occurred at Knottingly, on the Lancashire and Yorkshire Ry., March 11, 1901, says: "The



VIEW SHOWING POSITION OF FRACTURES IN STAYS AND WEAKENING EFFECT ON HOLDING POWER OF STAYS DUE TO SLIGHT BULGING OF COPPER PLATE BETWEEN THE STAYS.

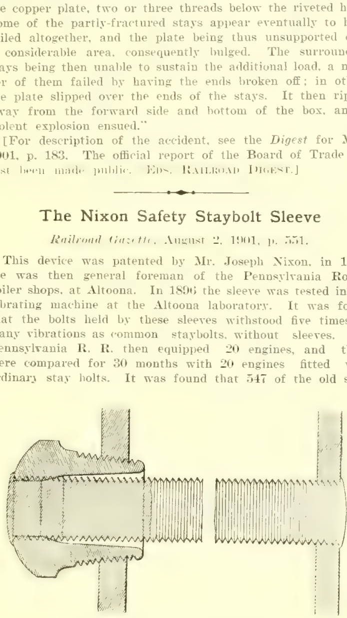
explosion was caused by the failure of a group of stays on the left side of the firebox, immediately below the brick arch. A few of the stays composing this group had been broken for some time before the explosion took place, the fractures having the discolored appearance that is produced by contact with water, the other stays in the group were partly cracked at the bottom of the threads, the fractures in each case being within the copper plate, two or three threads below the riveted head. Some of the partly-fractured stays appear eventually to have failed altogether, and the plate being thus unsupported over a considerable area, consequently bulged. The surrounding stays being then unable to sustain the additional load, a number of them failed by having the ends broken off; in others the plate slipped over the ends of the stays. It then ripped away from the forward side and bottom of the box, and a violent explosion ensued."

[For description of the accident, see the *Digest* for May, 1901, p. 183. The official report of the Board of Trade has just been made public. EDS. RAILROAD DIGEST.]

The Nixon Safety Staybolt Sleeve

Railroad Gazette, August 2, 1901, p. 551.

This device was patented by Mr. Joseph Nixon, in 1893. He was then general foreman of the Pennsylvania Road's boiler shops, at Altoona. In 1896 the sleeve was tested in the vibrating machine at the Altoona laboratory. It was found that the bolts held by these sleeves withstood five times as many vibrations as common staybolts, without sleeves. The Pennsylvania R. R. then equipped 20 engines, and these were compared for 30 months with 20 engines fitted with ordinary stay bolts. It was found that 547 of the old style



The Nixon Safety Staybolt Sleeve.

bolts had broken, while but 23 breaks had occurred in the engines using the Nixon sleeve. The cost of renewing the 547 bolts was $310, not counting the loss of service of the engines. The cost of renewing the 23 bolts was $7.13. The result of this test was that in 1898, the Pennsylvania Company adopted the Nixon sleeve as standard. The sleeve is made of malleable iron, and in case it breaks, the crack is outside the boiler shell, and the leak can be easily detected. In changing, the head of the sleeve is broken away from the bolt. The bolt is screwed a few threads through the inner plate, the rivet head is removed, and then the bolt is backed out through the shell. The fragments of the sleeve are then backed out, and a new one is put in its place. The sleeve is tapered on the outside

and tapped into the boiler shell, and the staybolt is tapped into the sleeve. The bolt hole in the sleeve has parallel sides at the outer end for a length equal to half the diameter of the bolt. From there it tapers, the inner end finishing in the bell mouth, so that when it is tapped the thread is a declining one.

Uniformity of Cut-Off

American Engineer and Railroad Journal, Aug., 1901, p. 239.

"In describing the new 'Central Atlantic' type passenger engines of the New York Central on page 39 of our February number, a table of the valve-setting measurements was presented as taken from one of the engines before it left the Schenectady Locomotive Works. Because of the remarkable uniformity of the cut-off measurements, which are very nearly perfect, the subject was investigated and by permission of the builders of the engines and also of Mr. A. M. Waitt, Superintendent of Motive Power of the road, a diagram of the detail measurements of the valve motion is now presented. These dimensions are believed to be sufficient to enable any one to set up the valve motion on a model for the purpose of investigating the subject for himself.

"It is well known to be difficult to obtain such results as these and to get approximately equal valve opening, front and back, at full stroke or up to 15 or 16 inches cut-off. As a rule the cut-off will not be as uniform as this table shows from full stroke to a cut-off of 6 inches. If equal at 6 inches it will usually be unequal at full stroke and perhaps be equal at 8 inches. The cut-off at full stroke in this case is longer than many have been able to obtain with a valve motion having 9-32 inches lead and 11-32 inch port opening at 6 inches cut-off. In order to get this lead and port opening it has usually been considered necessary to provide 1 1-4 inches lap and with this amount of lead the port opening and cut-off at full stroke has been decreased. For convenience the table of valve measurements is reproduced as follows:

Valve Motion Characteristics, "Central Atlantic" Type Locomotive. N. Y. C. & H. R. R. R.

No. of Notches.	Lead. Front stroke. Inches.	Lead. Back stroke. Inches.	Valve opens. Front stroke. Inches.	Valve opens. Back stroke. Inches.	Cut off. Front stroke. Inches.	Cut off. Back stroke. Inches.
Left	0	0	2	2	23	23 1/16
1 Right	0	0	2	2	23 1/16	23 1/8
2	1/8	1/8	1 1/4	1 1/4	21	21 1/16
3	5/32	5/32	15/16	15/16	19	19
4	3/16	3/16	13/16	13/16	17	17
5	7/32	7/32	5/8	5/8	15	15
Left	1/4 S	1/4 S	17/32	17/32	13	13
6 Right	1/4 S	1/4 S	17/32	17/32	13	13
7	1/4 F	1/4 F	7/16	7/16	11	11
8	9/32 S	9/32 S	13/32	13/32	[illegible]	9
	9/32	9/32	11/32	11/32	6	6 1/16

The following dimensions may also be convenient here:

Cylinders	21 by 26 ins.
Eccentric throw	5 3-4 ins.
Valve travel	6 ins.
Center of cylinder above center of axle	2 ins.
Saddle pin offset	1 in.
Steam lap	1 in.
Exhaust clearance	1-8 in.
Length of main rod	10 ft. 6 1-2 ins.
Admission	Internal
Width of port	1 5-8 in.
Motion hangers	Vertical
Radius of link	60 ins.

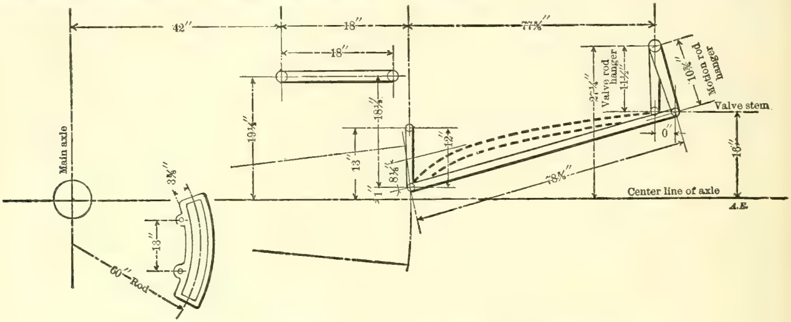


Diagram of Valve Motion—"Central Atlantic" Type Locomotive. New York Central & Hudson R ver Railroad.
(Not to scale.)

"In looking up the history of this valve motion we find that it originated with Mr. G. R. Henderson, while Mechanical Engineer of the Norfolk and Western Railway. It was applied by him, very successfully, to a locomotive on that road and was developed into the design of the 'Northwestern' type locomotives built at Schenectady last year for the Chicago and Northwestern Railway."

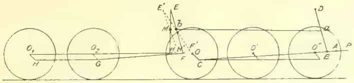
Hagan's Articulated Locomotive

Revue Generale des Chemins de fer, May, 1901, p. 477.

This engine, which belongs to the Prussian State Railway, is intended to haul heavy loads upon steep grades and over sharp curves. It stands upon ten wheels. The first three pairs are set in to the frame, but the last two are placed in a truck, which turns about a point situated between the third coupled axle that is attached to the frame and the front axle in the truck. The distance between these two axles being naturally subject to some variation, due to the radius of the curve.

The movement of the piston rod P is transmitted directly to the first three pairs of wheels, O, O′ and O″, by the connecting rod AC, and thence to the coupled wheels O_1 and O_2 of the truck by the system indicated in the illustration.

An oscillating lever turning about the point D is attached to the piston rod at B by means of a small connecting rod AB. The center of this rod is also attached by means of the rod *ab* to the center of a second oscillating lever turning about the point E. The lower end of this lever drives through the connecting rod F. G. and the parallel rod GH, the two wheels O_1 and O_1. The point of oscillation E is not fixed. It is attached to the end of a third lever, EH, which is in turn pivotted at its center M, which is fixed and whose lower end is attached by a rod HO_2 to the front axle of the truck. The result is that this third lever can by turning about the point M assume different



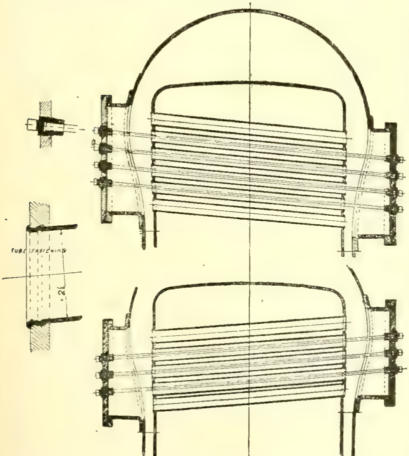
positions, according to the distance between the axles O and O_2, or, in other words, according to the radius of the curve.

If the axle O approaches O then, on account of the stiffness of the rod H O_2, the lever E M H will assume the position E_1 M H_1 by turning about M. The lever E *b* F will, in turn, assume the position E_1 *b* F_1 and the displacement HH_1 will be practically equal to FF_1. The length of the connecting rod which drives the axles O_1 and O_2 of the truck will not be changed and the movement of the pistons will be transmitted under the same conditions on curves as upon tangents.

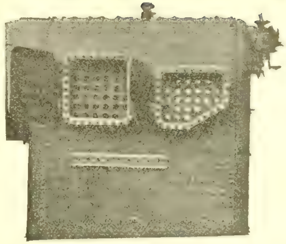
Dubs & Co.'s Engine at the Glasgow Exhibition

Engineering Times (London), August, 1901, p. 58.

Messrs. Dubs & Co., of Glasgow, have an engine at the Glasgow International Exhibition, built to the designs of Mr. Dugald-Drummond for the London and Southwestern Railway. The cylinders are 18 1-2 x 26 inches. Driving wheels 6 feet 7 inches in diameter. The number of tubes in barrel is 280. They are 1 1-2 inches outside diameter; those in the firebox are 61 in number, of 2 1-2 inch. diameter inside. The heating surface is tubes in barrel 1,187 square feet, in firebox 165 square feet. Firebox 158 square feet. Total 1,500 square feet. Working pressure 175 pounds per square inch. Grate area 24 square feet. The special feature of this engine is its water tube boiler. This consists of two nests of tubes extending across the inner firebox. In order to promote the circulation of water, one nest is inclined in an opposite direction to the other, the inclination being at the rate of one in eleven. The nests consist rspectively of 36 and 25 solid drawn steel tubes 2 3-4 inches outside diameter and 1-8 inch thick, expanded into and beaded on the firebox side plates. Doors are provided at both ends of each nest to give easy access to the tubes for inspection or renewal. Stays secured to the



VIEW SHOWING INCLINATION OF FRONT AND BACK NESTS OF TUBES IN DRUMMOND'S WATER-TUBE LOCOMOTIVE BOILER.



inspection doors by the screwed thimbles and running right through the tubes support the sides of the shell. [Incidentally these doors afford access for the purpose of cleaning the water legs of the boiler. The engine is a 4-4-0 type, with inside cylinders.—Eds. Railroad Digest.]

Hot Water for Washing Boilers

Railroad Gazette, August 23, 1901, p. 590.

The *Gazette* comments editorially upon some remarks made by Mr. Quereau in discussing the report of the Master Mechanics' Committee on an "Up-to-Date Round House." He said, in substance, that the temperature of a boiler under steam at working pressure is 365 degrees, while the hot water used in washing could not be properly handled if its temperature exceeded 120 degrees. Accepting these limits, the difference between the temperature of the boiler and the water used to wash it out would be 245 degrees. The average temperature of cold water used to wash with was 50 degrees, which when compared with hot water gives a difference of 315 degrees. Mr. Quereau thought this difference so little in excess of that which prevails when hot water is employed, that the added injury to the boiler incident to the use of cold water could not be great.

The *Gazette* points out that while the water in a boiler at 150 pounds pressure is 365 degrees, that is not the temperature of the water when the boiler is open for washing out. The blowing off process is a cooling down process, and when the boiler stands ready for washing the water is not hotter than 212 degrees. Hot water at 120 degrees, then only gives a difference of 92 degrees. If cold water at 50 degrees be used, the difference in temperature would be 162 degrees. From these considerations it would appear that by using hot water to wash out with instead of cold the cooling effects of the wash stream can be reduced nearly one-half.

Disposing of Air Pump Exhaust

Railroad and Locomotive Engineering, Aug. 1901, p. 368.

The practice followed by Mr. H. Schaefer, Central of New England, of turning the exhaust steam from the air pump into the cylinder saddle, has effected material saving of steam, besides abating the nuisance of the noise of the steam exhausting from the air pump. This is the most practicable way of disposing of the exhaust from the air pump that we have seen, and is well worthy of imitation. We find officials of some roads very zealous in urging enginemen to do all in their power to save coal, and at the same time they have the air pump exhaust pouring through the smokestack and fanning the fire in a way that wastes many tons of coal in the course of a year.

On some roads they are turning the exhaust from the airpump into the tender to heat the feed water, but that is a troublesome arrangement. It happens occasionally that an engineer lets the water get too hot for the injector to lift, and then there is the report of an engine failure. One engine failure offsets in expense the saving effected by many days' use of a feed water heater.

Car Equipment, Appliances and Related Matters

Cool Passenger Cars in France

Transport (London), Aug. 2, 1901, p. 92.

A despatch from Paris states that a novel contrivance for cooling railway carriages in hot weather has been fitted by the State Railway to all carriages of the 9 o'clock express train from Paris to Royan. It consists of a box measuring 3 feet by 18 inches, divided into compartments, and fixed to the front end of the carriage in such a way that a current of air passes through the compartments of the box, which are filled with ice, into the corridor, and thus keeps the interior of the carriage much cooler than the outside air.

Low-Side Gondola for Union Steel Co.

Railroad Gazette, August 2, 1901, p. 543.

The American Car and Foundry Company is building forty steel low-side gondolas for the Union Steel Co., from designs by Mr. George I. King, manager of the steel company's car department. The cars are designed for a load limit of 110,000 lbs. The estimated weight of the car, empty, is 31,700 lbs., making the percentage of dead weight to total load 22.4. The framing of the car is novel. The center sills are 18 inch. 55 lb. I-beams, extending only between the body bolsters, the body bolsters being the same section as the center sills. By using the short center sills, the bolsters can be made unusually deep and continuous between the side sills. The side sills are 9-in., 13 1-4 lbs., channels with flanges turned outward and the one-fourth inch floor plates cover the top flanges of these sills. Directly above the side sills are 15-in. 33 lbs. channels, which serve to confine the loading, and also assist the side sills to carry the load. The draw sills are the same size as those on top of the side sills, spaced 18-in. apart. The end sills are 9in. channels, and the ends of the car body are 15-in. channels, the same as the sides. The end sills have not to be cut away for the coupler. The connections joining center sills and draw sills are very heavy. The whole design has been worked out with a view to using automatic punching machines and also to do machine riveting wherever possible. The draw gear attachments are cast steel. This material is also used for center plates, buffer castings, and push-pole pockets. The trucks are of the arch bar type, having steel end castings and cast steel truck bolsters.

[The line of draw gear pull is placed slightly below centre line of centre sills, which is a good feature of the modern steel car.—EDS. RAILROAD DIGEST.]

Air Brake Repairs

Railroad Gazette, August 23, 1901, p. 591.

The *Gazette* comments editorially on an article by Mr. Otto Best, general air brake inspector, Nashville, Chattanooga and St. Louis Railway. The editorial writer says that he spent a couple of days at Nashville, and had an opportunity of personally inspecting the admirable system under which this work is handled. He says all appear to know what to do and how to do it. Behind this, however, is the very important fact that the management of the road takes an active interest in the work. That is the key to the whole situation. By keeping up the brakes the train service is improved. A larger return is got for the money invested in air brakes and a saving is made in the item of car repairs. Something like $60,000,000 has been spent in applying brakes to freight cars, and no return is given for this investment, if the brakes are inoperative. Less than a full return is given if they are left in bad order. At Nashville before the present system was in vogue there were as many as 100 freight cars a month with skidded wheels requiring removal. Attention to brakes has reduced this to about six cars, representing a monthly saving of about $3,600, slid wheels in passenger service have been reduced from about 50 pairs per month to practically none. The saving in wheels alone at this point has more than offset the cost of the air-brake inspection, repairs and testing. The chief cause for skidded wheels is brakes not releasing. Powerful modern engines can start a train in which there are one or two cars with brakes set, due to defective triple valves. If sand be used in starting the skidding of the wheels is all the more sure. When slid flat wheels are found the triple valve bush is generally worn. It takes about five minutes to remove a defective triple and replace it by one known to be clean and in good order. The replacing of all defective triples reduces the time taken to inspect brakes on through trains, and saves cutting out cars when time for repairs is limited. Concentrating the cleaning and minor repairs in a shop specially fitted up for the purpose enables a few skilled men to do it all. Good work is insured at small cost, as the men work without interruption and with suitable tools at hand. It also makes possible the testing of all triples before they are again put in service. The test for these valves is very severe. The conditions are those of a valve at the rear of a very long freight train. Air admitted to release the repaired triple passes through a 1-32 inch hole. Between the hole and the test triple are 15 feet of one-inch pipe, so that the pressure is increased very slowly. To pass the tests for light service, full service and emergency, it is absolutely necessary for the piston to fit the bushing throughout its length as closely as in a new valve. In no case has a triple passed this test and failed to act properly in service. The test has often shown cases which would not have been detected in the ordinary course of cleaning, but which would have failed to release in service. What is known as "heavy triple valve repairs" are done by the Westinghouse Company, and are not attempted on the N. C. & St. L. Ry.

Pneumatic Fan

Railway and Engineering Review, Aug. 3, 1901, p. 523.

The intense and long continued hot weather gives especial interest to a little arrangement devised by Mr. T. A. Foque, mechanical superintendent of the "Soo Line." It is a pneumatic fan, designed for use where electricity is not available, and where compressed air is. It works fully as well as an electric fan, and can be made at small expense. Mr. Foque has already furnished working drawings to some who have seen the fan in operation, and we understand he is willing to extend the favor. The amount of air required to run it is very small and "never would be missed."

[The idea might be capable of very satisfactory extension, in that it might be applied to the ventilation of passenger cars. A modern smoking or sleeping car would be all the more comfortable, if, without interfering with the brake system, one of Mr. Foque's fans could be used to cause a circulation of air.—EDS. RAILROAD DIGEST.]

Wheel Truing Brake Shoe

Railway Age, Aug. 2, 1901, p. 83.

The Wheel Truing Brake Shoe Company, of Detroit, Mich., manufactures a device which as its name implies is a shoe used for truing car and engine wheels. The shoe will fit any sized wheel or brake head. It is made with pockets, every alternate one of which is filled with a grinding material like a section of an emery wheel. When a pair of wheels become flattened it is only necessary to remove the regular brake shoes and apply a pair of truing shoes, run the car or engine, and in a few trips the wheels become true again. The truing shoes are then replaced by the ordinary ones. These shoes were first designed to be used on chilled cast iron wheels of electric cars, and are said to have proved a great success. Mr. J. M. Griffin, the president of the company, conceived the idea of making a composition which would work on steel, so that driving tires could be trued up in this manner, and recent experiments seem to have demonstrated the practicability of the device in this line. The idea is not new, but this company appear to have been the first to succeed in making a compo-

sition which will do the work. The saving effected is claimed to be enormous, as these shoes make the wheels true themselves, so to speak, while the latter are in service and earning money for the railroad company.

Over 200 electric roads are using this device, and consider it part of their regular equipment. An extensive foreign trade is also being done. The company makes a miniature sample shoe, which it will be glad to send to an official of any road who may be interested in having wheels trued cheaply.

Heating of Passenger Cars on French Railways

Le Genie Civil, May 25, 1901, p. 56

The article is one of a series, and in this issue deals with the systems of car heating in use upon the Eastern, Western and Northern Railways. It takes the matter up in some detail with numerous illustrations.

On the Eastern there is a peculiar and compact form of boiler that is held beneath the floor of the car. The heat is carried to the car by hot water and the circulation is continuous, that is to say, the water, starting from the boiler, passes through all of the radiators before returning.

On the Western the heater is of a single coil. This is also a hot water system, and the radiators are divided into two compartments. Through one there is a constant circulation of hot water, while through the other there is a current of cold water flowing in the opposite direction. The disadvantages involved in this system of heating are at once apparent. The general circulation is impeded by the fact that the cold water becomes reheated by its contact with the hot walls of the radiator, while the hot water yields a portion of its heat to the cold. The consequence is that an equilibrium is soon established and reversal of current may eventually take place.

On the Northern a mixed system is used, in which the water is heated by steam that may be taken from the locomotive. The Sleeping Car Company has used this system for a number of years, employing a Koerting injector which fills the double role of heater and impeller. This system has been taken up and perfected by the Northern Railway, which has adopted it in its latest type of passenger cars for high-speed trains.

The radiators are of bronze and the piping is of red copper. The main line of pipe, however, is of iron. The couplings are of rubber with a plug cock at the sill and a Westinghouse attachment at the free end. In spite of all the precautions that may be taken, the system is subject to the inconveniences of freezing. Hence it has been found to be necessary, during cold weather, to resort to great care, especially when the cars are uncoupled from the source of supply. The water of condensation must then be driven out of the pipes by means of compressed air.

Splicing Sills in Long Passenger Equipment

Railway and Engineering Review, July 6, 1901, p. 466.

The topical discussion at the M. C. B. convention on the question "Are there any objections to splicing all sills of long passenger equipment? If not, how should this be done according to the best modern practice?" Mr. Pflager of the Pullman Company said the practice followed by a large number of car builders is to make one splice in the sills of cars, the splice being 5 feet and over in length, and this shows that there are no objection to splicing sills in long passenger cars. If a sill of a passenger car has one splice in it, properly made, it is as strong as a continuous sill. Pullman practice has been for the last twenty years to make one splice in each of the sills under its cars. Mr. Pflager then read an extract from a letter from Mr. George W. West, superintendent of motive power, New York, Ontario and Western Railway, in which that gentleman speaks highly of the satisfactory behavior of two splices in passenger car sills, which had been in service sixteen years.

Mr. Pflager next pointed out some advantages to be gained by splicing. A better quality of lumber can be obtained with shorter pieces. Good sills 40 feet and under are easily obtained; if 60 feet or over in length, delivery was usually slow and quality inferior. It is cheaper to use sills with one splice made of two 40-foot pieces, or under, rather than to purchase a continuous sill about 70 feet long. The cost of splicing varies according to the splice made, and will run from $1.00 to $1.60 per sill. A 70-foot car with spliced sills insured a saving of about $39.70 over one with continuous sills. Deducting cost of splicing, viz., $9.60, a net saving of $30.10 per car resulted.

As to the best practice, the speaker said, his opinion is that what is known as a lock splice is the best. The length of the splice should be four times the width of the sill, and that the splice should be bolted together with two or more bolts. It is advisable to re-enforce the sill on side with an oak block 2 1-2 inches wide, the same depth as the sill, and about 6 feet long, bolting the re-enforcing block securely to the sill. With such a splice the sill is stronger at the point of splice than at any other point for resisting a downward load and for cross blow or strain. In splicing sills it is important that the splice be made over or very close to the needle beams, and that the splices be divided over the two centre cross ties or needle beams, the splices being arranged one over first cross tie, the second over the outside sills, outside the intermediate sill and inside the first cross tie. The strengthening blocks should be placed inside the outside sills, outside the intermediate sill and inside the centre sill.

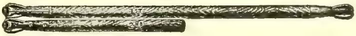
[The splice shown in the half-tone accompanying Mr. West's letter exhibits a splice similar to that given in the M. C. B. book of interchange rules. The splices shown in the illustrations have one re-enforcing block to each splice.—Eds. Railroad Digest.]

Shop Practice, Machinery and Tools

Flue Cleaners

Iron and Steel, August 3, 1901, p. 11.

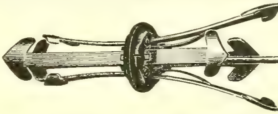
The Butman flue cleaner rod is constructed of tough light wood, connected together by a novel folding joint made of the best steel, so arranged that the rods will fold parallel in any direction. The socket holding the brush or scraper is so fitted



Butman Flue Cleaner Rod.

as to prevent the brush dropping down when pushed through the rear end of the boiler tubes. The rods are light and stiff, they do not become heated, are durable and strong, and can be folded up when not in use.

The Binghamton flue cleaner consists of a malleable iron hub, to which the rod attaches, and on which four steel blades with heart-shaped cutters at each end pivot through a slot in the blade. The knives or scale cutters are held securely in place by a split malleable iron ring, thus making the cleaver a jointed instrument, which cannot become detached by operat-



Binghamton Flue Cleaner.

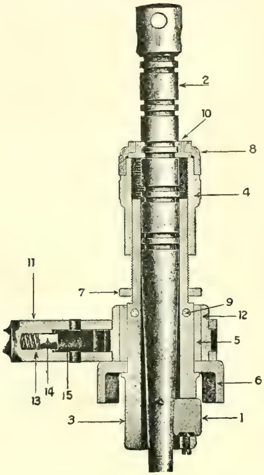
ing. The blades are shaped at the ends to accurately conform to the circle of the flue, and ground to a shear-cut edge. Between the split ring is a wood "fiber," or leather washer or disk, slightly larger than the iron ring, and this acts as a brush, in removing loosened scale or dirt. The knives of this cleaver, lap the track of each other and cut with both ends, thus covering the entire inside surface of the flue. The knives being shear cut, enables the cleaver to pass over blisters, where a square cleaver would stop.

These boiler flue appliances are manufactured by James McCrea & Co., 67 West Washington street, Chicago, Ill.

Atlas Tube Expander

Railway and Locomotive Engineering, August, 1901, p. 368.

This expander was designed with the view of doing away with the continued hammering on the taper pin, which is usually necessary, and to facilitate rolling down the imperfect interior surfaces of the tubes. Instead of revolving the taper pin the whole roller case is turned by a ratchet and the taper pin itself is fed by the hand feed nut, shown at 4, in the cut. The thin nut 7 is set to act as a depth gage so as to roll the tubes uniformly. The rollers, shown in the figure, are given the

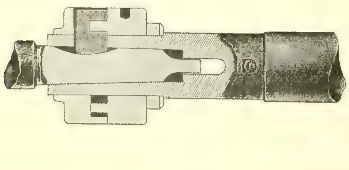


proper taper to bring the surface of the roll parallel with the interior surface of the tube, thus insuring a good joint throughout the entire thickness of the head and expanding the tube equally tight at both sides of the sheet. This expander handles five sizes of flues, as indicated by the five sets of grooves on the upper portion of the taper pin and the changing from one to the other is done in less than a minute. All that is necessary is to unscrew hand nut 8, remove collar 10, which is split, replace it in desired groove and screw on nut. The same rolls answer for all sizes. This appears to be an excellent tube expander, and further information can be obtained from the makers, the Watson-Stillman Company, 204 East 43d street, New York.

The Standard Grip Socket

Railroad Gazette, Aug. 9, 1901, p. 564.

The grip socket here shown is one of the time and money saving devices made by the Standard Tool Co., of Cleveland, Ohio. It is made suitable for straight or taper shank twist drills and similar tools. The design is simple and effective. A half turn of the gnurled collar is required to fully open the

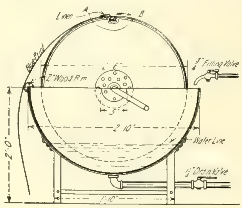


socket to receive the tool. Indicator marks or signs to distinguish when the socket is properly adjusted to receive the shank of the tool are unnecessary. The strong key, which holds the shank is governed by an eccentric cam, which makes it absolutely secure and positive. These advantages should be fully recognized in shops. Drills with broken tangs can be used, and injury to new drills is prevented. The socket is made of steel, all parts interchangeable.

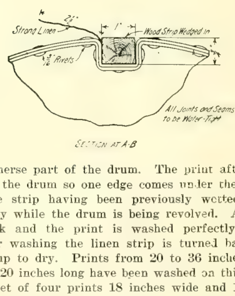
Tank for Washing Blue Prints

Railway and Engineering Review Aug. 24, 1901, p. 562.

The illustration shows an improved tub for washing blueprints, which has given good service in the drawing office of a Southern railway for about four years. It is simply a semicircular tub in which a hollow drum revolves, around which the blueprint is wound. In use the tub is half filled with water,



END VIEW



SECTION AT A-B

so as to immerse part of the drum. The print after exposure is laid upon the drum so one edge comes under the linen strip shown. The strip having been previously wetted holds the print securely while the drum is being revolved. A few turns of the crank and the print is washed perfectly clean and clear. After washing the linen strip is turned back and the print hung up to dry. Prints from 20 to 36 inches wide and from 72 to 120 inches long have been washed on this device. In one case a set of four prints 18 inches wide and 19 feet long were printed and washed, each print being one continuous piece.

Waterproofing Blue Prints

Engineering News, August 8, 1901, p. 96.

The *News* quotes Mines and Minerals. Immerse in melted paraffin until saturated, a number of pieces of an absorbent cloth a foot or more square, and when withdrawn and cooled they are ready for use at any time. To apply to a blue print spread one of the saturated cloths on a smooth surface, place the dry print on it with a second waxed cloth on top, and iron with a moderate flat iron. The paper immediately absorbs paraffin until saturated and becomes translucent and highly waterproof. The lines of the print are intensified by the process, and there is no shrinking or distortion. As the wax is withdrawn from the cloths more can be added by melting small pieces directly under the hot iron. By immersing the print in a bath of melted paraffin the process is hastened, but the ironing is necessary to remove the surplus wax from the surface, unless the paper is to be directly exposed to the

weather and not to be handled. The irons can be heated in most offices by gas or over a lamp, and a supply of saturated cloths obviates the necessity of the bath. This process, which was originally applied to blue prints to be carried by the engineer corps in wet mines, is equally applicable to any kind of paper and is convenient for waterproofing typewritten or other notices to be posted up and exposed to the weather.

Electric Equipment, Machinery and Appliances

Part of the Pennsylvania to be Electrically Operated

Western Electrician, August 17, 1901, p. 107.

It has been decided by the mangement of the Pennsylvania Railroad Company to substitute electricity for steam power on the Springfield and Xenia (Ohio) branches of the Panhandle road, and the work of changing the systems will be begun at once. It has been stated that the company will haul all freight as well as passengers by electric power. It is said that the company is also contemplating putting in motors on its Indianapolis and Vincennes (Ind.) branch, between Indianapolis and Martinsville. The cost of electric equipment will be about $7,000 a mile.

High-Speed Electric Traction at Berlin

Consular Reports, August 2, 1901, p. 1.

Mr. Frank H. Mason, consul general at Berlin, said that about three months ago there appeared in the American press a paragraph which stated that an experimental test of electric trains had been made on a new railway between Berlin and Hamburg, by which a speed of 125 miles an hour had been readily attained. All this was far from the actual fact, and it seems requisite that a plain, concise statement should be made of what has been undertaken by the experimenters at Berlin, what has been accomplished, and what yet remains to be done. No careful engineer or capitalist would enter upon the construction of a high-speed railway for actual service until the whole subject had been thoroughly studied and its feasibility proved by practical demonstration. For this purpose there was organized at Berlin, on the 10th of October, 1899, a so-called "company for experiments," in high-speed traction. This company represents the foremost scientific and mechanical ability of Germany. After more than a year of study and experiment, Director Rathenau, of the General Electric Company, in January of this year, had a formal interview with the German Emperor, in which he submitted a plan for using as an experimental electric line the military railway leading southward from Berlin to Zossen, a distance of 18.6 miles. The proposition was promptly and fully approved and from that moment the whole scheme has had the active support of the German government. The line to Zossen is now in process of preparation for the trials, and two motor cars have been built. Each will carry about fifty passengers, and efforts will be made to attain a speed of from 125 to 150 miles an hour.

Meanwhile, Messrs. Siemens & Halske have been making some preliminary tests on a short line, which was built for experimental purposes a year or two ago, at their works at Lichterfelde, near Berlin. The motive of these preliminary trials has been to test the hitherto undemonstrated point whether a motor moving at a speed of 100 miles an hour or more will take the current readily from a three-wire line.

In using this three-phase alternating current, it has been found necessary to employ three conductors, viz., two overhead wires and a third rail. The high-speed experiments here will be based on this arrangement, and the provisional line of Messrs. Siemens & Halske has carried a step further the experience already gained by Swiss and Italian roads at ordinary speeds, and yielded some highly interesting and valuable results.

There is no electrical railway between Berlin and Hamburg, nor will one be seriously thought of until the high-speed experiments on the short line between Berlin and Zossen have demonstrated exactly and conclusively every condition of the problem. These experiments will be undertaken when the line to Zossen is specially prepared and the two motor cars are ready.

The trials, when they do occur, will attract electricians, machinists, railway managers, and expert scientists from all European countries, and the results, if successful, will mark a notable epoch at the beginning of the century. From all that can be learned from the eminent, but very conservative, men who have the enterprise in charge, no insurmountable difficulties have yet been encountered. The real difficulties of the problem have yet to be met.

Electric Headlights

Railway and Locomotive Engineering, Aug., 1901, p. 352.

In the Pyle-National and Edwards systems a steam turbine is used which has the great advantage of being very reliable and having practically no wearing parts. The complete apparatus consist of an engine, a dynamo or generator and an arc lamp.

Early experimenters discovered that an electric current was produced by moving or passing a wire in the space between the two poles of a magnet and the modern dynamo is a practical working out of this discovery.

The terms used in electricity are apt to confuse those who are only familiar with steam. In steam we speak of pressure in pounds; in electrical matters "volts" represents the intensity of pressure. In steam we have the friction of pipes and passages for resistance as well as the work against the piston. In electricity the resistance of the wires to the passage of current is called "ohms" and on this depends the volume or amount of current "amperes" which flows.

The engine and dynamo or lighting set may be placed either just behind lamp or in any other location desired. It is better to get as short a steam pipe as possible to avoid condensation, which means that the nearer the dome one can place the lighting set, the better. The wires can easily be run to lamp from any position

With the turbine engine there is very little to lubricate; a little black oil once or twice a month in top of engine case is sufficient.

The speed of the Pyle engine should not be over 2,500 (1,800 is the proper figure), and it is advisable to disconnect the lamp occasionally and take the speed. If above this, the governor valves need grinding in. Should this be neglected too long, the electric engine may race and fly to pieces.

The lamps should be carefully studied from the instruction books; and as the lamps vary in detail, only a few general suggestions can be given. The lighting set should be tried before starting out on a run, to be sure that everything is all right. "Short circuits" are perhaps the worst enemy. Electricity is peculiar, in the fact that if there are a dozen outlets for current it will go in all of them, but the most goes in the easiest channel. If the lamp burns dimly or goes out altogether, look for a short circuit, although there is a possibility of its being in the adjustment of the lamp itself. In fact, the lamp adjustment is one of the points to be watched most carefully.

If the lamp burns green, just reverse the wires in the binding post; the current is going through the wrong way, making the lamp burn upside down.

Electric vs. Steam Railways

Electrical Review (London), August 2, 1901, p. 173.

At a meeting of the City and South London Railway Company, held recently, Mr. C. G. Mott stated that the working expenses of the great steam railways for the first half of 1901 would be found to be in the neighborhood of 70 per cent. of the receipts. He reported that the continued efforts to bring down the working expenses of electric underground traction had been so successful that the figure now was 52.36 per cent., as against 59.36 during the corresponding period in 1900. The cost had been 79 per cent. when the line started. The City and South London Company has a heavy item of expense, which steam roads do not have, viz.: the "lifts" by which passengers

are conveyed from and to the surface. Deducting the cost of running and maintaining these lifts the figure 52.36 is reduced to 41.2 per cent. The figures for steam as against electricity stand 70 to 41 1-4 per cent. Such figures are ample testimony to the economic benefits to be derived from the working of short railway lines by electric traction. It may seem hardly fair to compare a great trunk railway line with a short electric line, but the heavy capitalization of the deep-level line on account of its costly tunnelling has to be set down as its peculiar disadvantage.

The writer of the article thinks that a more practical and even more interesting comparison of working expenses would have been made if those of the Central London (the "tuppeny" tube) had been plotted side by side with those of the City and South London—the one with its heavy American electric locomotives and the other with light English ones, both companies bearing the cost of lifts at stations. It is stated by the way that the working expenses of the Waterloo and City Electric Line, on which there are no lifts, come to 54.78 per cent. of the receipts of last year. The City and South London Railway is said to be the world's pioneer underground electric line.

[Referring to the heavy cost entailed in the tunnel construction of these "tube" railways in London, it may be stated that the underground rapid transit line now being built in New York city is estimated to cost about $1,000,000 a mile.—Eds. Railroad Digest.]

Conducting Transportation

Icing Stations for Refrigerator Cars

American Engineer and Railroad Journal, Aug., 1901, p. 250.

A correspondent, who is an operating official, recently inquired why principles followed in handling locomotive fuel from cars to tenders could not be applied to the icing of trains of refrigerating cars. He suggested the coal-chute idea for handling ice. Upon looking for information it was found that this was done on the Pittsburg, Fort Wayne & Chicago Ry. in the Sixteenth Street yards in Chicago several years ago. The object is to ice the cars in trains, and to do it cheaply and quickly in order to permit of forwarding the trains without delay when they are iced in transit.

The refrigerator cars are placed on the track beside a trestle which carries the ice cars, and the ice is handled from the ice cars upon a long platform which is the proper height to skid the ice into the tanks in the refrigerators. The approach to the trestle is inclined with a grade of 2.2 feet per 100 feet, and is about 590 feet long. The icing platform is 156 feet long and level, the trestle is 300 feet long and about half is on the grade. The refrigerator track is 940 feet long, which is ample for the purpose.

This platform has been found very satisfactory. About 350 cars are iced per month, giving from 4,000 to 4,500 pounds of ice to each car. With this arrangement the ice may be carried along the platform in a small truck in which it is broken up and then dumped into the cars.

English and American Methods of Conducting Traffic

The Engineer, August 16, 1901, p. 169.

The Engineer recommends those who never tire of explaining that the methods of British railway traffic managers are all wrong, and those of American managers are all right, to read an extract from a speech by Lord Stalbridge, chairman of the London and Northwestern Railway at the 111th half-yearly meeting. He said, it must be remembered that the system of trade in this country is totally different from that in America. In France, time is legally allowed for railways in which to deliver goods. Similar time allowance in England would permit his company to occupy five days between London and Manchester, London to Carlisle six days, to Dublin six days, and to Glasgow eight days, but the merchant in Manchester or Glasgow expected his goods to be in hand the day after he had written about them. The great bulk of American traffic consists of vast quantities of grain, coal, etc., carried very great distances. In Great Britain the goods traffic consists of small lots carried comparatively short distances. In England a good deal had been done in the way of increasing train loads, but increasing train loads, if carried to an extreme, means delay to goods. If the company's officials got a lot of goods for one place, and put these aside until they they got other lots for the same place, delay would be caused. The company had tried very successfully, a large transhipping warehouse at Crewe. This, it was hoped, would tend to decrease the handling of packages and ensure prompter deliveries to the public and better loading for the trains. Lord Stalbridge said the directors were fully alive to the necessity of economy in train miles, and train loads. They were fully aware of the American way of working, and they were constantly corresponding with friends on the other side of the Atlantic, who informed them of every novelty they had in America.

N. Y. C. and L. & N. W. Rys. Contrasted

Railway Age, August 2, 1901, p. 75.

An interesting comparison of the New York Central and the London and North-Western Railways has been published by Mr. W. J. Hammond in the New York *Commercial Advertiser*. It is, perhaps, more of a contrast than a comparison, because no good comes from the comparison of unlike quantities. Contrasting the two roads then, the average haul of each ton of freight on the English line is only 35 1-4 miles, as compared with 163 miles on the American; and the former gets average ton-mile revenue of 2 1-3 cents, as against the latter's 1-2 cent, or a trifle more. At the same time the North-Western hauls its goods in trainloads of 96 tons, while the Central averages loads of 363 tons. No comment on the utter dissimilarity of traffic conditions here indicated, is necessary. A great deal of talk is heard in the United Kingdom just now of the importance of getting larger trainloads, and no wonder; but the task is not altogether easy notwithstanding the fact that 96-ton loads look to Americans like play railroading. In the passanger department the two companies stand more nearly on the same plane, although the average journey in England is about 12 1-4 miles, as against 31 on the New York Central.

Proper Language on the Lehigh

Railroad Gazette, August 23, 1901, p. 583.

A correspondent signing himself G. O. Meter, writes the *Gazette* regarding a recent order issued on the Lehigh Valley Railroad requiring crews of shifting engines to use only the English language while on duty. The order says "under no circumstances must Pennsylvania German be spoken." The order is said to have been issued for the reason that a serious collision nearly resulted because a conductor gave directions to his crew in this tongue, and a brakeman, who did not understand it perfectly, shifted some cars to the wrong track. This Pennsylvania German is a strange combination of English and the German dialect spoken in Northern Bavaria. About two millions of people in Pennsylvania speak it, and probably a million more who have emigrated to the Middle West use it in daily conversation.

Medical and Surgical Matters

Medical and Law Departments of a Railway Company

International Journal of Surgery, August, 1901, p. 254.

At the sixth annual meeting of the Association of Surgeons of the Southern Railway Company, at Mobile, Ala., Colonel

Charles M. Blackford, assistant division counsel of the road, delivered an address, in which he said that he took exception to that part of the form of the medical report which requires the surgeon to record and report the statement given by the person injured as to the manner of the accident. The surgeon, he said, should not be degraded into the detective, and should not be called upon to tell what the injured person said as to how the accident occurred. Such statements should be recorded by some one other than the surgeon, as the latter stands to the patient in a confidential relation, and all statements made under such circumstances are privileged communications, and this sacred character is not altered, because the company pays the doctor's bill.

Continuing, he said, addressing the doctors directly and pointedly, when they become factors in the law department as witnesses: "Tell the truth, but do not present it in such naked and unattractive form that its moral as well as its narrative effect may be worse than a lie. There are many people who think they establish their character for veracity by making the truth as disagreeable as possible; yet there is a lack of truth in this. Second. Always use that species of common sense which will do most good to the two parties to whom you owe allegiance—your patient and the railroad company. Your first duty is to the person injured of course; but the company is pecuniarily interested in the application of your best skill to the injured person, for the sooner he is restored to health the less must be his claim for damages. But by far the most important thing is to use common sense in court. A doctor, as a witness, should confine himself to his more comprehensive knowledge and give the results of his personal skill and observation in clear and simple language; he must always preserve his mental poise, good naturedly confessing ignorance where some catch question is propounded, and must never undertake to fence with the cross-examining lawyer. Third. When on the witness stand do not talk too much. Always confine yourselves to the questions asked and to such explanations as will make your answer intelligible.

Accidents due to Nervous Disease

Railway and Engineering Review, August 10, 1901, p. 539.

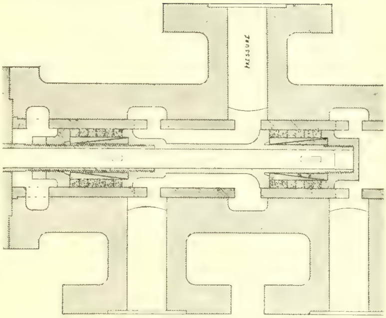
It was deemed of enough importance to cable from England that at the annual meeting of the British Medical Association, Dr. Alexander Scott, of Glasgow, stated that most railway accidents are due to neurosis of railway operatives. It is undoubtedly true that the nervous tension in running trains, operating signals, etc., is great, and it is not every man who can stand it. The doctor was undoubtedly right in saying that in selecting men for these positions careful attention should be paid to temperament. Railway employes cannot be built to order, but nothing pays better than the exercise of intelligent discrimination in selecting those for the most important service.

Miscellaneous

Heston Expansible Packing Rings

American Manufacturer, July 18, 1901, p. 880.

William Heston, of Homestead, Pa., has designed an expansible packing ring which is especially serviceable to hydraulic pistons. The prime object of the invention is to expand piston rings when these become worn, without taking the cylinder head off. It has been the common practice to split the piston rings, allowing the spring of the circular pieces of metal thus released to expand against the sides of the cylinder, thus keeping the pressure in its proper place. While this has worked successfully in steam engines, in hydraulic cylinders the pressure has been too great and other expedients have been resorted to. In the view shown it will be seen that the rod extending from the piston through the cylinder has at its extreme end a thread



on which a nut is screwed. This nut finds a bearing on the rack yoke meshing with the operating segment of gear. The piston rings in this case are composed of pieces of leather held in position by a collar which holds the leather tightly, although the rings can be made of other material. The ring is screwed to force the leather into position. Back of the piston rings are wedges. These can be tightened up by screwing the nut at the end of the rod down on its collar, forcing the piston rings against the side of the cylinder. The wedges can be held in position by a pair of fingers or by having the piston rod made with a collar attached, into which the wedges rest, as shown in the sectional view. Mr. Heston has organized the Heston Hydraulic Valve and Supply Company, with offices at 339 Fifth Avenue, Pittsburg, and is having exceptional success in introducing his invention.

Roundhouse Problem Solved

Railway and Engineering Review, July 27, 1901, p. 516.

The problem of properly housing the modern long locomotive has been solved in a practical manner by Mr. Eugene F. Brady, of Altoona, Pa., who has recently procured a patent for an improved roundhouse. In carrying out his invention Mr. Brady has provided for applying an extended roof section to the front of an ordinary roundhouse, and also provided sets of slidable doors for the adjacent pairs of tracks which run into the roundhouse. The members of each pair of doors are mounted upon separate parallel tracks, which are disposed transversely of the adjacent railway tracks, and located at the outer edge of the supplemental or extended roof portion, the doors being movable in opposite directions so as to open either track and close the other. It will of course be understood that the roundhouse is associated with the usual turntable located at the front thereof and adapted to register with a plurality of radial track sections running into the roundhouse in the usual manner.

New German Fuel

Consular Reports, July 19, 1901, p. 4.

Under date of June 20, 1901, Consul Hughes, of Coburg says: The Imperial German navy and some German manufacturers are using large quantities of "masut" (an oily product of brown coal tar) for heating and steam-producing purposes. The advantages over coal are stated as follows: (1) The heat-producing qualities of "masut" are said to be one-fourth greater than those of coal; (2) the oil is easier to handle, it being only necessary to open a valve; (3) very little smoke comes from the use of the "masut;" (4) steam can be produced and full power reached in less time. The coast defense vessels of the German navy are fitted for the use of this oil. Some of the battle ships and cruisers are also so arranged that they can use both coal and "masut."

The Vacuum Gauge

Science and Industry, July, 1901, p. 297.

The ancients supposed that the air had no weight; this idea prevailed until about the middle ages, when an Italian philosopher (Torricelli) by pure reasoning arrived at the conclusion that the air must have weight. It was noticed by some well-digger that it was impossible to lift water from a well when the height from the surface of the water to the pump exceeded 34 feet. This fact led the philosopher to the idea that it was the weight of the atmosphere which forced the water to flow up into the pump. In order to test the correctness of this idea he experimented with mercury. This element is 13.6 times heavier than water, and he reasoned that mercury should rise to about 30 inches, as $30 \times 13.6 = 408$ inches, or 34 feet. By experiment he found his theory to have been correct. The mercury stood at nearly 30 inches and the space above was void of any pressure, and is said to be a perfect vacuum.

The earlier types of steam engines used steam at low boiler pressure, and were condensing. In order to find the force propelling the piston forward, it was necessary to measure the pressure per square inch that existed in the condenser. Metallic dial gauges were at that time unknown, and engineers used a mercury column to indicate the degree of partial vacuum in the condenser. A perfect vacuum was said to equal 30 inches of mercury. The difference between the barometer and the vacuum gauge is, that while the barometer indicates, by the height of its mercury column, the pressure of the atmosphere, the mercury vacuum gauge, by the height of its column, indicates how much of the atmospheric pressure has been removed from the exhaust side of the piston of a condensing steam engine. Consequently a vacuum gauge does not directly indicate the pressure existing in a condenser, but rather the amount by which the atmospheric pressure is greater than the pressure in the condenser. The reading of the indication of the vacuum gauge may be summed up as follows: (1) To obtain the absolute pressure in pounds per square inch in the condenser, subtract the reading of the vacuum gauge from 30, and multiply the remainder by 0.49; (2) To obtain the amount of pressure in pounds per square inch by which the pressure in the condenser has been reduced below the atmospheric pressure, multiply the indication of the vacuum gauge by 0.49. This interesting article is by Mr. R. Rudolph.

Petroleum as Fuel

Science and Industry, August, 1901, p. 375.

The article is contributed by Mr. G. E. Walsh. He says, now that the awakening trade on the Pacific coast with the Orient has become very marked, the fuel problem is receiving more attention than ever. Not only is the Los Angeles Terminal Railroad operated entirely by petroleum fuel, but a great number of manufacturing establishments have adopted it. With oil at 75 cents a barrel, this has been found to be cheaper than coal for many purposes. In some cases the saving is from 50 to 60 per cent. over coal. The future of this fuel must be of great importance to the development of the Pacific coast. The supply seems at present to be almost inexhaustible. The best grades of California petroleum develop approximately 21,000 heat units per ponnd when fully burned, while the best steam coal approximates only 1,400 heat units under perfect combustion. It is possible to get more perfect combustion from oil than from coal, and the evaporation of water pound for pound is much greater, also, in favor of liquid fuel.

After dealing with the probable quantity and location of oil deposits all over the globe, and the commercial aspect of the question, he continues: "If there is not sufficient demand for kerosene to meet the supply, there is danger of the liquid fuel in time containing too great a percentage of dangerous volatile substances to make it safe and profitable. It is in refining the oil, that these volatile substances are removed." Petroleum fuel is valuable, because it is made from residue, and does not form the only commercial product of the oil mines.

Effect of Temperature on Iron

National Engineer, Aug., 1901, p. 12.

An official statement of tests made at the Massachusetts arsenal to ascertain the effect of temperature on the strength of iron has been published. The specimens were heated by rows of Bunsen burners, which were arranged in a muffle and the temperatures of the test specimens were judged by their observed expansions. Each piece was heated to the temperature of the test before being strained, and its expansion determined by a micrometer, and co-efficient of expansion of each grade of metal having been determined the tests began; the temperature could be inferred with considerable precision. An abstract of five of these tests, shows that the strength of steel is greater at about 500 deg. F. than it is at 70 deg. F. These five series of tests were made with five different qualities of steel containing respectively 0.09, 0.20, 0.31, 0.37, 0.51 per cent. of carbon, and the percentage of strength was obtained by dividing the tensile strength of a sample of steel at a given temperature by the strength of the same quality of steel at 70 deg. The result presents the interesting fact that the specimens in question were all stronger in the neighborhood of zero than they were at ordinary temperatures—all of them, in fact, showing a minimum of strength at 210 deg. F. or thereabout, and a maximum of strength at about 550 deg. F.

The Professional Spirit

Western Electrician, July 20, 1901, p. 39.

At the commencement exercises of Rensselaer Polytechnic Institute, Col. H. G. Prout spoke of "the professional spirit," which consists in the professional man having as a primary consideration the interests of his client, whether the latter be a person, a city, or a state. He drew a distinct line between the business man and the professional man. The business man, according to the speaker, holds as secondary the producing of a beautiful or a useful article, or the addition of health and happiness to those around him; his primary considerations are dividends, and the criterion by which he judges of his success is the money profit he makes. The professional man, on the other hand, "can think only incidentally of his fees." The true professional spirit "must save the railroads and the great industrial corporations from some of the disasters which arrogance and ignorance are provoking."

The Railways of the World

The Engineer (London), July 5, 1901, p. 16.

The useful work, known as "Railway Archives," published by the Russian Ministry of Public Works, contains every year a review dealing with railway development throughout the world. According to the figures available in 1899, it appears that at the end of that year the length of all the railway systems in the world amounted to 772,159 kiloms., or 478,739 miles. This length of railroads represents nineteen and a quarter times, plus 800 kiloms., the circumference of the earth at the equator, the latter being 40,070 kiloms., and it exceeds by 3,000 kiloms. twice the mean distance of the moon from the earth, or 384,420 kiloms. The figures 722,159 kiloms. betoken the total length of the various tracks, and no account is taken of the fact that a line happens to possess two or more lines of rails.

Fire Proof Wood

Electrical Review, July 27, 1901, p. 112.

Under a French process, wood, treated to a bath of magnesium sulphate, is said to become fireproof. Lead electrodes are used, the one being separated from the other by a sailcloth diaphragm. A direct current of 110 volts is passed through the wood, which extracts the sap and replaces it by a non-inflammable salt. It is said that the process has been successfully applied to the manufacture of paving blocks. The rate of energy is about half an electric horse power at 20 to 30 volts per cubic metre. The treatment of the wood lasts about 48 hours.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

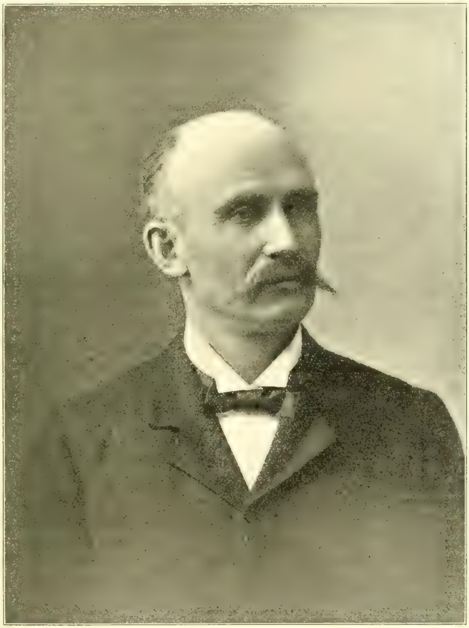
M. C. & L. P. A. Portrait Gallery

CHARLES E. COPP.

As I am "appearing before the curtain" to thank my friends for their kind support and to bow myself out of these columns I am tempted at the last minute to "give myself away" in a brief autobiography, as a kind of penance for begging the same from so many of my associates for publication in these columns in recent years.

I was born in a country farming town in New Hampshire—it's no use in telling you where, you couldn't find it by "shaking the sheets" or looking on any map you ever saw—September 11, 1848, and therefore I shall enjoy the privilege and the distinction of celebrating my birthday by attending our annual convention. I was first elected president in Cincinnati on my birthday, and as I told you then, my good mother often told me that she made thirty-nine apple dumplings for dinner the day I was born; not that I needed so many, but she had boarders from the Portsmouth, N. H., Navy Yard, who were up in that region getting out masts, spars, and ship-timber for Uncle Sam's ancient craft. Why she had not made 40 dumplings so as to have had an even number I don't know, unless she mistrusted that I might be the 40th one myself. I arrived, anyway, "on time."

Concerning the land of my nativity, it enjoys one distinction, so it has been said—I am not vouching for the truth of it—of being so rocky that the farmers have to sharpen the sheeps' noses so that they can get down between the rocks and get the grass. If this state of things has helped to "sharpen my wits" to get a living without working, then I am only too glad. It's an awful nice country, to contemplate in summer—and to emigrate from in winter.



CHARLES E. COPP.

How on earth I ever took it into my head to become a sign painter up in that country, then 17 miles from a railroad, where about the only sign needed is one to the crows to be wise before it is too late, and keep off the corn patch before they get filled with lead—not from the painting but from a shotgun—has always been somewhat of a mystery to me; but I expect it is something on this wise: Another fellow—now dead—and I, were artistic rivals in the country school, "the little red" one—for honors at slate embellishment, comic and otherwise; consequently I early developed more of a bump for this sort of thing than for that learning which, if more closely followed, would doubtless have landed me—at the Philippines, possibly, instead of a car paint shop. One day, dreaming—I had plenty of time then to dream—being at a sort of Yankee crossroads, I stooped down and picked up a sign, that had blown down, which had long indicated to "weary Willies" the distance and way to the next town. A sudden fit took me—who knows but I can "make my life sublime and leave footprints on the sands of time" by making and painting one of these signs to put up here for the information of the public. "Suiting the action to the word," as a narrator says, I did so. That was my first effort at lettering. It was admired—by me. The tools it was done with would adorn a museum. Other signs followed, at the village stores and elsewhere; in fact, there were signs that my father would give me "a walloping" if I did not attend to the farm and let that silly painting business alone; but the storm cloud was "busted" by the timely advice of a city friend, who said to my father, "Let him alone; if he gets *his* trade he will make more money than you can on this farm." He lived long enough to see his prophecy fulfilled with nothing to brag of in a financial way, either. His prophecy was safe.

Without entering into "harrowing details," suffice it to say, in course of time I was apprenticed to a thorough carriage sign and ornamental painter at Lake Village, now Lockport, N. H., in the autumn of 1867, when I was 19 years of age, where "I wrought," as our English cousins say, for six months without seeing a cent or my mother—only my board. In course of time I found myself working on cars at the Laconia Car Co.'s shops and, with various shiftings about between there and Boston, one day, by advice of Mr. A. L. Scott, foreman painter of the Boston & Lowell R. R., East Cambridge, Mass., one of the charter members of the M. C. & L. P. A., I went to Lawrence, much downcast, and "tackled" Warner Bailey for a job in a city where I never

had been before and where I knew not a soul. To my surprise he hired me. This was October 20, 1870. Now "get hold of his button hole" and he will tell you the rest. I may say, however, in closing, that I went to work under Mr. Bailey for the Boston & Maine, October 21, 1870, and succeeded him as foreman (honestly) June 1, 1872, where I have since remained, being promoted to my present position October 1, 1896. Now, by a lease of his road in 1895, Mr. Bailey is back into the B. & M. fold; in fact, we are about all working for the B. & M. hereabouts, directly and indirectly, and there are doubtless some outlying towns and counties yet to hear from. It is scarcely safe for any foreman painter down on this end of the continent to be so rash as to say he will never work for the B. & M. unless he "leaves the world and climbs a tree."

Valedictory

To readers of "Railroad Paint Shop," M. C. & L. P. A. Members, particularly, Greeting:

The Publishers of the RAILROAD DIGEST having decided to discontinue the "Railroad Paint Shop" as a department of this periodical, the time has now come when I must bid you farewell as editor of these columns. I regret this, as it seems like severing family ties. Eight years ago last month I took charge of this department and my "Salutatory" appeared. I began with many misgivings, but with a firm belief that such a department, properly conducted, in such a medium as this paper is, could not but redound to the benefit of our Association in the eyes of the railway mechanical world. I am of the same opinion still; and if any other result has come about it has been because of the mistakes and shortsightedness of your imperfect editor, rather than any design to injure any one, especially the association of which I am so justly proud, that has actuated me. I had edited this department one year when you, as an association, made this your official organ at the Buffalo convention in 1894, and have maintained it as such ever since annually, by unanimous vote, subscribing for it as a body to be paid for out of your treasury. Far from disguising your sentiments toward me, you have openly praised my efforts in your assembly. I feel, therefore, indebted to you for your kind appreciation. My chief aim has been to elevate the standard of car maintenance from the painter's standpoint and to improve the painter's standing among his fellows in the railway mechanical world. If I have succeeded in any degree I am glad; if I have not, I leave it with regret to others, sorry for any failure and deeply appreciative of the assistance that has been cheerfully rendered me by many of my readers and contributors.

These associations have been very pleasant, to be so vitally in touch with my peers in our chosen calling throughout this broad domain. Were it not for the fact that I still hope to meet you annually in convention this step would be taken with even greater reluctance and sadness. With apologies to the editor-in-chief and to compositors for hurried writing and bad "copy," I now bid one and all an affectionate frewell as editor of the "Railroad Paint Shop" and make my bow with my latest and best photo., reproduced in another column.

CHARLES E. COPP.

Removing Paint From Locomotive Tanks

Editor "Railroad Paint Shop:"

As the subject of removing paint from locomotive tanks is once more to the front, a few words from one who is interested may be in order. For the present we are burning off locomotive tanks at West Albany with ordinary gasoline and a compressed air burner, the same that is used for burning off the paint of our passenger cars.

This kind of burner has often been described in the columns of mechanical journals, and many of them are in common use throughout the country in the different railroad shops. We allow $3.00 per tank for burning off the old paint and putting the tank in condition for priming. I have used, with more or less success, about everything that has come along, including the sand blast, which is all right provided all the conditions are favorable.

One of the objections to this practice is that it can not be used in the same room where other work is being done on account of the dust created, which is ruinous to machinery, as well as to the painting and varnishing which may be under way. Being always on the alert for something better, and believing that we are none too old to learn, one often gains knowledge from a source from which it is least expected.

After many years' experience with various methods of removing paint I recently learned what seems to be an improvement over any of the old methods. While calling at one of our division shops the foreman painter in charge related to me an experience he had had with a job of this kind. Previous to that time it had been his practice to some extent to remove the paint from locomotive tanks by blowing steam into the tank causing the paint to blister, which was then scraped off while hot.

On this particular ocasion the steam was insufficient to produce heat enough to cause the paint to blister, and having no material on hand for making the lime and caustic soda plaster, he was at a loss to know how to proceed, when "Tom," one of the laborers who was assisting in the work said to the foreman, "Me take him off quick in four hours." "You cannot do it in that time," said the foreman. "You would have to *scrape* it all off and that would take you two or three times four hours." "I bet you one dollar I take him off in four hours," said "Tom." "All right," said the foreman, "I will give you one dollar to show me how you can do it." "Tom" asked for three pounds of concentrated lye which he dissolved in two and one-half gallons of water; and, while the tank was kept hot by the steam inside, he swabbed the lye all over the surface and left it for a short time, then gave it a second coat.

The lye, assisted by the steam, softened the paint and varnish very rapidly, so that in a little while all that remained to be done was to wash it off with water, forced through a hose. In less than three hours "Tom" had earned his dollar, and the foreman was satisfied that he had learned how to remove the paint from a locomotive tank by a quick process, and at an expense not to exceed $1.

I have not had a chance to try this process on account of our steam plant being on its "summer vacation." Try it for yourself, there may be something in it.

H. M. BUTTS,
Master Car and Locomotive Painter, N. Y. C. & H. R. R. R.

A Paint "Pot Pourri"

Editor Railroad Paint Shop:—

On the eve of our coming convention, to be held at the present Mecca of all true Americans, Buffalo, N. Y., on September 10th, I have become impressed with the idea that I should let my associates know that I am still in the business, have been, and am at present doing a booming general line of railway equipment painting in our company's shops; in fact, I have been so busy in both mind and body that I have hesitated to stop long enough to write and thereby express my pleasure in reading and noting that the people of our car painting world were jogging along apace with the other trades in the world of mechanics.

Although somewhat tardy, I am, nevertheless, greatly elated over the fact that congratulations are in order to our active associates for the prompt disposal by ballot of the next-place-of-meeting controversy. The principal cause of my elation is that Buffalo finally won; in consequence of which I now can hope for the opportunity of getting back into the good graces of our esteemed friend, Warner Bailey, who, I was given to understand, had threatened to cut the acquaintance of every mother's son of those twenty fellows (members of advisory committee and all) who met in Cincinnati last February 22d, in case the "clan cry" of associated master car painters failed to say, "Put Me Off At Buffalo."

In noting current affairs I also desire to express my pleasure at learning of our esteemed friend, F. S. Ball, becoming the inventor of an up to date emulsion car cleaning compound which, I am given to understand, is "the real thing." I was further informed from a reliable source that Mr. Ball is sucessfully machine-painting, (not the clouds this time), but freight cars, red.

Brothers Gohen and Copp will please note that Brother Ball is rapidly yielding to the softening influence of time; and, he being now one of us, we should make a very happy, one-minded quartet when meeting at Buffalo.

I have been an interested reader of the ably edited Railroad Paint Shop. I was especially interested in the "varnish flattening" question introduced by Mr. Hubbs several months ago, and commented upon by Mr. Brazier of the New York Central and Mr. Keil, of the Lake Shore. Mr. Hubbs' idea of a sun-bake cure for the varnish flattening nuisance was certainly out of the ordinary channels of car paint shop theory and practice, but which, if practical, would suggest to the car official the advisability of constructing hot air departments in order that those fugitive first coats of varnish can be baked on, or in. The novelty of the experiment would surely make it worth the trying. I should like to hear of some one with one of those up to date, small shops with steam heating facilities, trying this cure, as it were, this japanning-on process of varnishing. It might do some good if only to instruct the sometimes-met-with railway official who thinks and acts as though any old place was good enough to paint cars in.

The flattening of varnish is undoubtedly one of the car painters' worst troubles and it is my opinion that, owing to the quicker methods and material used nowadays, the trouble is becoming more prevalent. To paint a car more quickly, means quicker methods and drying materials. As an instance I will cite one of those oft demanded six-hour, free-of-dirt-drying, railway body varnishes. Now is it reasonable for us to suppose that the oil of such varnish (the life of its wearing qualities), which must be excessively charged with oxydizing matter, can result in anything but a prematurely half-perished body of varnish? When cleaned up for revarnishing it will, as a natural consequence, swallow up by absorption all after-applied varnish. The more put on, the worse the "deviltry."

It is true that a sensitive, high-class body varnish is more apt to "silk" or "flat" than the quicker kind; but it is reasonable for us to claim that in 95 per cent. of cases where such grades of varnish "flat," the fault can be traced to a lack of properly drained, heated, or ventilated shops. It is also true that this trouble can occur in the best of shops at certain seasons of the year (where the best of heating and ventilating systems exist), if, by accident or neglect, the shop temperature is allowed to go to excessive extremes.

I am pleased to have such officials as Mr. Brazier write for a solution of such matters. Let us have more of the encouragement of such men who are willing to admit that there are some adverse material and physical conditions in the car paint shop that should enlist a portion of the time and attention of the official in charge of the department, to such an extent that the painter should not always be held responsible without investigation of matters not always under his control.

W. O. QUEST,
P. & L. E. R. R.

Cost of Car Painting by Spray and Brush

There is a circular, going the rounds, exploiting a certain paint, which purports to be a reprint from the *American Engineer and Railroad Journal*, of July, 1901, and signed "Car Builder," that makes, to our mind, some extravagant claims as to the saving in cost, of painting box cars by air over the brush method, particularly in the amount of paint saved by the spray process. We are willing to concede that there is no waste of paint by the spray method, with right appliances and air pressure and the machine in the hands of an expert, when compared with the brush, as generally used on this work; but we are not willing to allow any saving of paint, as a rule; certainly not as much as here given. We have measured it many times and it generally came out about even by both methods. The saving is in the hours of labor only. We subjoin the substance of the circular above referred to and ask our readers if 12 gallons of paint is not a pretty big dose for two coats on a 36-foot box car. We quote as follows:

"There is a wide difference of opinion as to the relative merits of painting freight cars by spraying or by brush. The arguments against spraying are that contract shops do not use this method and that it wastes paint.

"If properly used there is no waste of paint, as has been shown by erecting a canvas tent with canvas floor, and spraying a number of cars inside the tent. The weight of the canvas before and after showed the waste of the paint, which amounted to but a few ounces.

"The following test, made by a large railroad system, needs no comment. It shows that contract shops, using brushes, cannot compete with the sprayer.

"The following is the test record:

SPRAYING.

A. and D. car No. 1196 (in fair condition), sides and ends, 684 sq. ft. Paint used, 13 lbs.	$ .95 1-4
Time required, 26 minutes	.06 1-2
Total for body	$1.01 3-4
Roof paint, 9 lbs. 3 oz.	$ .68
Time req'd, 10 min.	.02 1
	.70 1-2
Total for sides, ends and roof	$1.72 1-4
R. and D. car No. 3671 (in bad condition), sides and ends, 734 sq. ft. Paint required, 17 lbs. 4 oz.	$1.27 3-4
Time required, 17 1-2 minutes	.04 1-2
Total for sides and ends	$1.32 1-4
Roof paint, 9 lbs. 3 oz.	$ .68
Time req'd, 10 min.	.02 1-2
	70 1-2
Total for sides, ends and roof	$2.02 3-4

"Several other cars were sprayed, all showing the same result as to cost within a few cents. Compare this now with the following figures given by another road using "wall" brushes and two coats of linseed oil, paste and japan dryer. The two coats were necessary to give a gloss. The car repainted was a 36-foot box car.

COST WITH BRUSHES.

Paint used, 12 gals. at 60c. per gal.	$7.20
Time required, 3 1-2 hours	.52
Total for sides, ends and roof	$7.72

"The $7.72 represents the cost of applying two coats of paint. Because of the qualifications of the paint used with the sprayer but one coat was necessary. By taking half of the $7.72 or $3.86, and comparing it with the $1.72 1-4 and $2.02 3-4, a fair comparison may be had of sprayer versus brush."

Some Things the B. & M. has done During the Past Year

The annual report has it that the Boston & Maine put through its six passenger shops for the year ending June 30 last, 1497 cars for cleaning, painting and varnishing. This is somewhat in excess of the total equipment of that road, but there were a few cars of other lines done, and some were shopped twice for various reasons. The whole equipment was shopped excepting, three officers' cars and eight or ten combination baggage and smoking cars on distant branches of the system that could not be spared from service in time to be completed before June 30. This is 240 cars over the output of the previous year, owing to the acquisition of the large Fitchburg shops by lease in July last, which not only did its own equipment but made up the loss of over a hundred cars by closing the Springfield shops, and about a score of cars besides, turning out 384 cars, and thus leading all the shops on the system, Somerville being a close second with 374 and Concord third with 349. Lawrence 155, Salem 146 and the little Lyndonville shop last with 79.

The entire passenger equipment of 260 cars of the Fitchburg road has been painted to standard and lettered "Boston & Maine." In all, the B. & M. has painted throughout 354 cars and cleaned and varnished 1143. Sixty-seven were burnt off, 234 painted over the old paint (about 200 of the latter being Fitchburg cars by lease) and 52 were new or resheathed. 344 were "cut in" and 427 were varnished inside. It certainly speaks well for the B. & M. to be able to do so much for the comfort of the numerous patrons.

The car department men painted in the year 23 locomotives at Springfield, 88 at Concord and 62 at Lyndonville. There was also a total of 3,673 cars of the freight equipment painted, or about one-fifth of the whole. Much blotting out and remarking of Fitchburg freight equipment to Boston & Maine has been done.

The entire passenger equipment has been classified and renumbered, excepting the ten or dozen that failed to reach the shops within the year and about sixty cars that went out of shops be-

tween July 1st, 1900, and about the middle of October when the renumbering order was issued.

All passenger car interiors have been made uniform as never before; that is to say, the name or initials of the road in various styles have been removed from end deck panels and the panels left blank; the old numbers have been erased from the top rails of doors and the same left blank and the new number placed on the finish at the right of the door going out. The name "Boston & Maine" appears on the middle rail of the end door of each passenger apartment for which a transfer design has recently been made and put to use. Another transfer for the outside of the doors to read "Passengers are not allowed to Stand on the Platform," is contemplated to take the place of the bronze plate bearing the same legend, which in metal tarnishes black and when dipped bright in the brass room is glaring and alike unreadable in both cases, besides being more expensive to maintain than the former. The old brass and bronze to be discarded ought to nearly pay for the new transfers.

All the above is not written in any spirit of boastfulness, but simply to let the great West know what little "down East" is doing and to give due credit to B. & M. liberality and the untiring energy and enterprise of its Master Car Builder, Mr. John T. Chamberlain, who is known, by the way, to a few designers of the forest beyond the Ohio river.

Navy Yard Lessons

Incidental to a recent trip to Portsmouth, N. H., to look after the cleaning and varnishing of the electric street cars, operated by the B. & M. there, I accepted the kind invitation received the summer before from the head sailmaker of the navy yard to visit and look over the plant, and was surprised to find it so much up to date with compressed air borers, hoists, etc., with the air carried from the plant in a pipe thousands of feet out to the "Raleigh," in dry dock for repairs, in the various decks of which, with wire-wound hose and multiple cocks, the "jammed wind" was "on tap" for every purpose required. Painters were lying on their backs in the dry dock running chippers or scrapers, taking off the rust and scale on her bottom preparatory to a coat of paint, as well as were many other kinds of work gong on. What a din! And yet you could hear a pin drop, no doubt, in comparison with the time of the great battle in which this famous boat fired the first shot—"the shot heard 'round the world." It seemed we could hear the noted Admiral say, "You may fire, Gridley, when ready."

Then there was the "Reina Mercedes" of Santiago honor and dishonor undergoing the same operations, with its mighty punctures of Uncle Sam's solid shot still in sight that went to her vitals and sank her as a sort of consort with the "Merrimac." What memories these scenes aroused! We seemed to be walking on human lives and history as we paced the rusty decks and cross beams.

Another thing we saw, of pertinence to this department especially, and that was, red lead is still being used by tons—for everything—on iron everywhere, all through these boats above, below, and between decks, for its preservation. Strange, isn't it, if this material is good for nothing for this purpose, as some say? Still, "Uncle Sam" is somewhat of an "old fogy." He may get on to something better some day; but you can reckon he will eye it with suspicion a long time before he makes up his mind to change. They do say a fellow has a paint that has to be applied hot for this purpose that has stood some remarkable salt water tests, but "Uncle Sam" has not dipped into it much yet for fear of being "buncoed" with some gold brick scheme. White lead for the outsides of the scores upon scores of barges, cutters, dingies, launches, punts, etc., that are made here to equip battleships and cruisers made elsewhere, is used here, ton upon ton, in fact, but little paint stock other than white and red lead is used at all, save the spar varnish on the gunwales, thwarts, etc. And many worse paints are made and foisted upon the market than white and red lead.

Here a tremendous excavation, 800x100 feet, and deep enough for the biggest battleship, is being made for a new dry dock, much of it being blasted through solid ledge. The old dry dock is merely a huge, square, wooden scow, or boat, with square ends, that is let out of its slip to deep water with huge hawsers. In this is the "Raleigh"—a boat within a boat.

If there is any conceited railroad man who thinks railroad shops are the only places where they have modern contrivances, he should pay "Uncle Sam" a visit and see how things are done, and he may find that "Uncle Sam" is not so slow after all.

A Midsummer Trip

Rather dull and worn down by close appliation to duties I yielded to a recent impulse and hied myself away over the Fitchburg division of the Boston & Maine to Albany, N. Y.; and, unheralded, was lucky to find Bro. Butts, of the N. Y. Central, at his desk. After a profitable discussion on the car-cleaning question and an examination of some experimental panels that were revelations on the subject, a hasty look was then taken around this extensive plant, where the force of employees in both locomotive and car departments runs into the thousands in the busy season. The paintshop, which ordinarily contains about 50 cars, was practically empty, as might have been expected at this season, when travel over this popular line is at its height to the great Pan-American show. Too much was seen to give even a passing note of here. Suffice it to say that the West Albany shops of the N. Y. C. must be a busy place with the full force on. Mr. A. C. Allen, formerly of the L. S. & M. S. shops at Buffalo, is the foreman in direct charge of the paint-shop, under Mr. Butts, the master painter; but we did not meet Mr. Allen, for he was out, we regret to state, on the sad duty of burying his esteemed wife. It is to be hoped, however, that he will see his way clear to meet with us in Buffalo. Piecework is in vogue at this shop for all paint-shop work, even to details. I was shown a very comprehensive list of prices by Mr. Butts. It is astonishing how expert, bright young men will become at work in this way and what a vast amount of work they will turn out and increase their net earnings at even lower rates. This is beneficial to both employer and employee. When a piece-price is established that benefits the employer the employee should also share in it and not be continually cut down to a point where he must work with all his might and main to get a pittance. Let him share in the profits where he puts his wits and energies and you will reap an increased income from his labor and raise the standard of employees. It is understood that the piece-work system is very satisfactory to all concerned at the above shop.

I enjoyed a pleasant visit over night in the family of Mr. Butts and took the magnificent steamer "Albany," of the "Day Line," down the Hudson, a hundred miles to West Point, to visit my son, who is a "yearling" cadet at the Military Academy there. To say that this ride down the Hudson and back was charming, and the scenery about West Point grand, is to repeat a many-times-told tale. It must all be seen and enjoyed to be appreciated. At the Military Academy while the cadets are in camp the maneuvers are particularly interesting. If any of our readers are in New York and wish to pass a pleasant day enjoyably they can do so by taking the 8.40 a. m. "Day Line" boat for $1 (round trip) 50 miles to West Point and spend three hours about this historic spot and return on the down river boat.

The cadets also got "put off at Buffalo." having struck tents Aug. 14, where they put in two weeks, returning Aug. 28, not probably in pleasure seeking, but in doing "stunts" for the delight of those who like to see what Uncle Sam's "boys" can do.

A Painter's Advice

Scrimp, if you must, on some part of the construction of the car, or your house, but do not do so on the quality of the painting materials, especially where exposure to the weather enters into the problem. You will pay dearly for the whistle in the end, if you do. How painstaking and particular some people are about everything else until the painting is reached, and then, presto! most anything will do, so long as it is paint and it is slushed over quickly. Never was there a more regrettable mistake made. Poor materials—unsuitable for the work in hand—means flaking, chipping and peeling until the work you had painted largely for appearance sake is ever and anon an eyesore to you. It is never right. You keep scraping and painting the scabby surface in spots and places and touching them up and kicking yourself all the time for your folly in being so penny

wise and pound foolish; and, unless you are a member of the Y. M. C. A. in good and regular standing, your dictation about it would not look well taken down and typewritten and sent through the mails. In fact, it wouldn't sound well to hear Poll Parrot repeat what you have said. Perhaps you had the paint given you "just to try;" and, under the general impression that it is not best to look a gift horse in the mouth, on she went with alacrity by the square yard. This was not recently, but a few years ago. It looked all right then. You smoked your cigar (if out of doors) strolled around it with eminent satisfaction and congratulated yourself on your good fortune. But today all is changed. Now you are kicking yourself. The man who gave you that stuff was no friend of yours! It was a dear gift to you to accept. You would have been in pocket, and taking comfort today where you have sorrow, if you had turned it into the dump and gone and bought good materials at market prices.

Don't be buncoed with good words and fair speeches. Suitable pigments and vehicles for a paint to stand exposure to the weather under all conditions are not to be found under every flat rock or in every clay pit. Horace Greeley once said his business as editor of the Tribune was not so much to see what should go into his paper as to see what should be kept out. You would do mighty well, my boy, to copy the venerable Horace in this respect as to painting materials that somebody is dying to have go on your rolling stock, or on your valuable house. It's a mighty good place to keep off a big lot of it. It's a heap better off than on. In fact it will cost you more to get off what remains than it would have cost to cover the whole surface with good material in the first place, to say nothing of the pent-up anguish and swear words you have choked down about it or failed to deliver for want of a suitable audience! (It takes a man with a lot of courage to swear at empty benches.) But when your temper gets up to concert pitch you'll rave and say that house has got to be burned off and away you go at it without consulting the insurance department (or the fire department either) and sparks from automatic burners work their way into cracks behind cornices, and the first you know, you have a fire on your hands that is not "personally conducted," with the result that an alarm is pulled in and clang! clang! down come the fire laddies on your premises as masters of the ceremonies and after a heroic struggle you have what is left, minus your insurance!

Now take a true friend's advice, and don't do it again, i. e., don't paint with materials that won't stay a reasonable length of time with ordinary wear and exposure just because you get them cheaply; and I'll charge you nothing for it, though if your comfort is worth anything to you you will feel like remembering me after you have provided for all the foreign missionaries.

"Cutting in" Cars

Cutting in cars has been somewhat opposed by the writer, excepting as a last resort and when absolutely necessary to maintain a clear, uniform color on the body of the car; but he has come to the conlusion of late that a more frequent cutting in of color on cracked cars has the effect of sealing up the cracks somewhat, of restoring the color, and of prolonging the life of the paint—thus putting off the day of burning-off. As a color suitable to "cut in" has been in use but ten years on his road, this change of sentiment is not unaccountable. Therefore 344 cars out of a total of 1,497 put through B. & M. shops for the year ending June 30, 1901, were cut in, to the betterment, I think, of the equipment, besides 234 more that were painted over the old paint and striped and lettered throughout, the latter being mostly Fitchburg cars being changed to Boston & Maine standards. This is one beneficial effect of a dark color over a light, that some of the advocates of the latter did not see in our blind zeal in its defense; we had to learn it by experience where we acquire all our best lessons. We should be loth to return to the yellow body color now, having seen the practically beneficial results of the dark colors, notwithstanding there are some drawbacks, of course, in their use; as, for instance, the shortening of the life of the varnish by the greater attraction of the sun's rays and the consequent increased heat, burning out its vitality, in hot weather when the car is not cooled by motion in service where it will generally last the longer.

Notes and Comments

Seven years ago the Master Car and Locomotive Painters' Association met in convention at Buffalo. At that time the members gave Mr. Robert McKeon, their efficient and faithful secretary for 25 years, a sort of "silver wedding" by presenting him with a diamond shirt stud. Mr. McKeon is still with us in the same acceptable official capacity.

Secretaries "may come" and secretaries "may go," but Robert "goes on forever."

Now "boys," because you are close by great attractions and allurements to draw you away from the sessions of the convention, you should practice self-denial and not yield to the temptation to put in all your time at the Exposition Grounds. As our daily sessions will doubtless be from 9 a. m. to 1 p. m., there will be ample time in four days to see the show from the close of our sessions until late in the evening, taking supper on the grounds. This is unofficial, but a word of caution from one who has felt the way President Bruning will feel unless you attend promptly upon the sessions and work of the convention. Let us do up our work, first and then "play."

Mr. F. E. Haylock, formerly foreman painter with the Rutland R. R., for upwards of four years, at Rutland, Vt., but for nearly two years past a representative of the Devoe & Raynolds Co., has severed his connection with the latter concern (on account of the reent death of their railroad manager, Mr. A. D. Keys, for whom he worked) and is now in the market for another position. He has worked at car painting for over twenty years in such shops as Jones', Gilbert's, Wason's, Jackson & Sharp's, Wagner's, Pullman, N. Y. C. & H. R. R., West Shore, Housatonic, Fitchburg, Central Vt., and can furnish plenty of good references. His address is 929 State street, Schenectady, N. Y.

We learn that Mr. Robert Scott, formerly master painter of the Seaboard Air Line, at Portsmouth, Va., is now with the New York, Philadelphia & Norfolk, at Cape Charles, Va. During the interim he travelled for awhile for N. Z. Graves & Co.

Mr. Edward Webb, formerly with the Laconia Car Co., Laconia, N. H., but recently with the Metropolitan Street R. R., of New York, is now working for the Boston Elevated R. R., Boston, Mass., under Harry Libby. He expects to meet with us at the Buffalo convention.

One sees some queer names and things on signs in his travels, especially if he is a sign painter and notices such things. "Joel Joel" is a cigar manufacturer in Fitchburg; a sort of second chapter of Joel, as it were. "Gasper Police" deals in fruit, cigars, confectionery, etc., at Woodsville, N. H. "C. Meleones" is a fruit dealer near this sanctum, but we have not learned whether or not his first name is "Cantaloupe." As another example of glaringly bad English there is a huge sign on the line of the B. & M. that says "Roy—Bros" (with dash between "Roy" and "Bros.") are "manufactures" instead of manufacturers of wooden ware. Somebody must be "manufactures" of wooden heads thereabouts.

At the sixteenth annual convention of the New York State Association of Master House Painters and Decorators, as reported in the *Painters' Magazine*, a gentleman read a brief paper on "Painting Galvanized Iron," in which he advocated a priming of yellow ochre and fat linseed oil so as to produce a tacky or gold-size effect, which will last, he says, for an indefinite period. In the discussion that followed, one said he used red lead and linseed oil, another yellow ochre and lamp black, to which still another agreed. Red lead and oil seemed to get "the black eye," as it were, if not a "knockout" blow.

In our opinion the gold-size preparation has something to recommend it for this purpose. As we have said before in these columns, a priming of slow-drying, oily, outside car finishing varnish is good. So are some of the oily resinous car primers. Anything fatty and tenacious that will long retain its elasticity will be found to give good results for this troublesome purpose. And yet "an ounce of prevention" of the use of galvanized iron for most any purpose is worth "a pound of cure" in its painting.

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

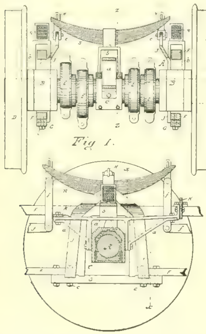
Locomotive

No. 679,808.

GEORGE W. WEST, Middletown, N. Y.

The extremely heavy locomotives that are now being built and the limited space on the axles for the lengths of the driving-box bearings are often productive of sufficient friction (when running at the usual train speeds) to cause the axles and bearings to become heated and necessitate long stops and consequent delays and danger therefrom.

The object of the invention is to distribute the weight of the locomotive on the axle by placing an extra journal-bearing upon the axle, and thus reduce the amount of pressure per square inch



of bearing-surface in proportion to the extra bearing-surface acquired. As the weight of the locomotive is distributed to the bearings through a system of springs and their connections to alleviate the effects of sudden severe shocks from the bearings, the success of my invention requires the third or auxiliary journal-bearing to uphold its proportionate weight of the locomotive in a like manner.

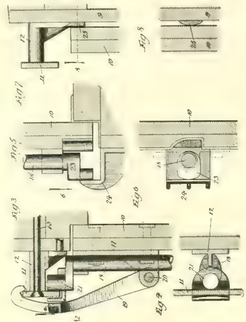
Car-Door

No. 679,633.

CLARENCE M. MENDENHALL, of Bloomington, Ill.

The invention relates particularly to that type of car-door which when closed is flush with the outside of the car, so that it will not be disturbed by striking or rubbing against obstructions along the side of the track.

The first of the objects of the invention is to reduce to a minimum the amount



of projection of the devices which carry the door and which are most conveniently applied to the outside thereof and to at the same time provide a construction of door carrying, suspending, and securing devices which will be both simple and efficient in their operation and at the same time cheap to construct.

Another object of the invention is the provision of mechanism for carrying the rear end of the door so constructed that the same may be moved laterally with reference to the rail upon which the door is suspended, locked securely in position when the door is closed, and released and moved outwardly to be slid back to open position with a maximum degree of facility.

Another object of the invention is to provide a body-plate at the upper end of the rear of the door which shall act both as a socket and guide for the end of the vertical operating-rod and also as an anchorage-casting to which a hanger may be attached by means of a horizontal pivot.

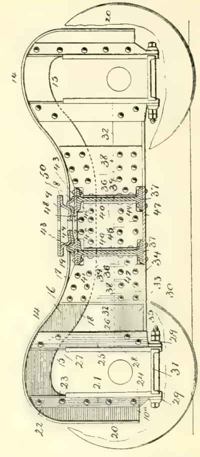
Another object of the invention is the provision of a novel form of rail-supporting column or bracket provided at the lower end thereof with a downwardly-extending projection adapted to act as a guide for the door and prevent the same from coming in rubbing contact with the side of the car when the door is being opened.

Car-Truck

No. 678,802.

CORNELIUS VANDERBILT, of New York, N. Y.

The invention is claimed as follows: In a car truck, the combination with the side frames comprising the upper chord having a depressed central portion and a pendent arm, a face-plate provided with



an inwardly projecting transverse web secured to said pendent arm to form the outer arm of the axle-box jaws or pedestals, a lower chord provided with a vertical side web and an inwardly projecting horizontal lower web or flange, a second upright face-plate, having an inwardly projecting transverse web, extending between the upper and lower chords to form the inner arm of the axle-box jaws or pedestals, the inwardly projecting flange of said lower chord being cut away to receive said second upright face-plate and means for connecting the lower ends of the transverse webs of said face-plates, substantially as described.

The invention has for its object the construction of a car truck with as few parts as possible, and where feasible those parts are to be made of commercial shapes of iron, so as to avoid the necessity of expensive machinery in the construction of the parts, and, further, to provide a truck which may be readily and economically made and assembled and which may be kept in repair at a comparatively small expense, at the same time providing a simple and efficient structure.

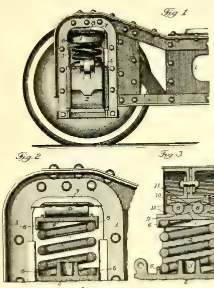
Car-Truck

No. 680,516.

EDWIN S. WOODS, of Chicago, Ill.

The combination with a car-truck, and an axle-box, of a supporting-spring, a spring-bearing cap, a crown-piece attached to the truck-frame, and a pair of twin rollers interposed between the bearing-cap and the crown-piece and adapted to afford independent lateral movement to the axle-box, the opposed faces of the bearing-cap and crown-piece being formed with curved or dished recesses forming tracks for the rollers, and having end stop flanges or ribs.

The combination with a car-truck, and



an axle-box, of a supporting-spring, a spring-bearing cap, a crown-piece attached to the truck-frame, and a pair of twin rollers interposed between the bearing-cap and the crown-piece in a central zone of a less area than the supporting-spring, the opposed faces of the bearing-cap and crown-piece being formed with curved or dished recesses forming tracks for the rollers and having end stop flanges or ribs.

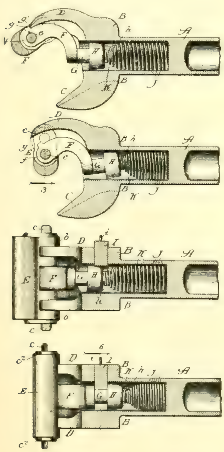
Automatic Car-Coupling

No. 679,531.

JAMES C. LEIDY, of Galesburg, Ill.

The invention has for its main object to prolong the life of couplers as to the wearing away or impairment of the coupling hook or knuckle or latch-block.

It is well known that by long and continued use the coupling hook or knuckle or latch-block in automatic car-couplers wear away on the acting or engaging face, requiring in time the replacement of the knuckle by a new one in order to maintain the proper connection without too much loose play.



The primary object of the invention is to enable the knuckle after it is worn on one side to be reversed and present the opposite face as the acting one for use, thereby giving the coupling the benefit of the wear of both faces of the knuckle and consequently increasing the length of time the coupler can be used without replacing a worn-out knuckle with a new one.

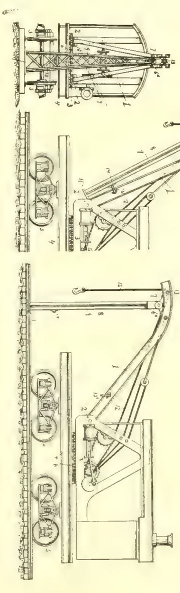
Further objects of the invention are to improve the attachment of the knuckle to the head of the draw-bar, to improve the means for locking the knuckle in its closed position and permitting the release thereof for opening the coupler, to improve the connection between knuckle and draw-bar and its head for opening and closing the knuckle, and to improve generally the construction and operation of the parts which enter into the construction of the coupler as a whole.

Strut for Wrecking-Cars

No. 679,840.

JOHN E. GRAHAM, of Roanoke, Va.

The object of the present invention is to improve the construction of railway wrecking cars adapted to raise and remove heavy bodies and to provide a simple, inexpensive and efficient device adapted to greatly increase the capacity of wrecking cars for this purpose and capable of affording a firm support for the boom of a wrecking-car, whereby the latter will be prevented from being capsized or upset by any weight or strain to which the boom may be subjected.



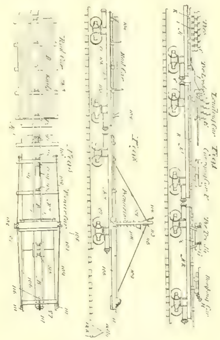
A wrecking-car having a pivoted boom, arranged to swing around the car, said car being also provided with a strut, hinged to and carried by the boom at the outer portion thereof and arranged to rest upon the ground or other support, whereby the wrecking-car is relieved of strain, said strut being adapted to be folded against the boom.

Railroad-Track-Laying Apparatus

No. 676,893.

GEORGE F. H. HICKS, of Chicago, Ill.

The invention relates to improvements in railroad track-laying apparatus designed for promoting the convenience and rapidity of handling both ties and rails in the construction of railroads and in which flat cars are employed for storing the ties and rails, but provided with special superstructure for subsequently conducting both the ties and the rails to the forward end of the train, from which they are laid in their operative position.



It relates more particularly to railroad track-laying apparatus in which heretofore the rails have been piled or stacked at the centre of and entirely across the platform of a flat car and both the rails and the ties conducted from their point of storage to the forward and laying end of the train of cars by means of tramways arranged at the outside or sides of the flatcars, projecting beyond said side or sides, and also to other structures in which the rails are piled at the sides of the cars and conducted to the forward end of the train upon trucks arranged on a narrow-gauge tramway at the centre of the car, while the ties are conducted to the forward end of the car upon trucks running upon broad-gauge tramways and substantially broader than the railway track being laid.

The prime object of the invention is to centralize the devices both for conducting the rails and the ties to the forward end of the train and to a position promoting the rapidity of the discharge of both from the cars, facilitating the laying of the

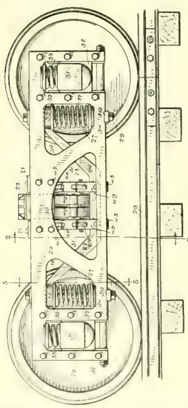
same, and in so doing dispense with broad-gauge tramways and the necessary additional superstructure therefor and at the same time facilitate and substantially increase the capacity of a track-laying apparatus for delivering rails and ties to the operative point for laying the same on a railway bed.

Railway-Truck

No. 680,587.

NATHAN H. HEFT, of Bridgeport, Conn.

The invention has for its object to provide a railway-truck adapted for use on either steam or electric railways, and especially adapted for use on electric railways where heavy cars are required to be run at a high speed over a rough and uneven roadbed, important features of novelty, being that the bolster, elliptical springs and spring-plank are suspended by means of swing links. Numerous advantages result from and are peculiar to my novel construction. It is deemed sufficient for the purposes of this specification to mention that the weight of the truck as a whole is much less than that of any truck of this character heretofore placed upon the market. The general construction and arrangement of parts are such that the truck as a whole is stronger and cheaper to build. The springs are all in pairs, and each spring carries an equal part of the weight. The spring travel of the bolster is nearly three times as great as in any truck heretofore devised, it being understood, of course, that in using the term "bolster" I include by implication the car-body as well.



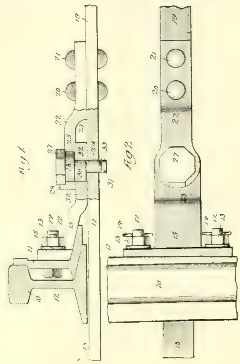
The importan[illegible] resulting from the use of my novel truck may be generalized under two main heads—first, ease of riding and greatly-increased comfort to passengers, owing to increased spring motion and reduced motion of the body, rising and falling of the bolster and car-body, as well as lateral and swaying movements being practically eliminated, and, second, that owing to the greatly-increased spring travel and the novel mode in which the bolster is supported the blows of the wheels at the joints are almost completely dissipated—i e., taken up during their transmission through the springs —whereby the life of the truck is greatly increased and the cost of maintenance not only of the track-rails, but of the wheels, axles, springs, truck-frames as a whole, and car-bodies as a whole, is enormously reduced.

Adjustable Switch-Rod

No. 679,153.

WILLIS C. LEE and MILES F. MOORE, of Chicago, Ill., assignors to Morden Frog & Crossing Works, of same place.

The inventors claim: In an adjustable switch rod, the combination of an arm



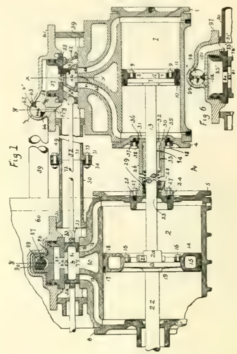
or lug adapted to be secured to one rail, a switch rod adapted to be secured to the other rail, jaws on one of said members inclosing two opposite sides of the other member, a bolt passing through said jaws having an eccentric portion engaging the member between the jaws, a polygonal head upon said bolt, a lug on one of said jaws adapted to engage said head of the bolt, the proportions of said lug, the eccentric on the bolt and the member between the jaws being such that when the bolt head is lifted clear of the lug the eccentric will still engage the member between the jaws.

Steam-Engine

No. 679,949.

HENRY F. COLVIN, of Philadelphia, Pa.

The objects of the invention are to construct a multiple-cylinder engine in a manner to afford easy access to the pistons and their packing-rings; to provide for the easy introduction and removal of the pistons; to reduce the number of stuffing-boxes heretofore necessary for tandem engines and reduce them to nearly the minimum, as heretofore only necessary on simple engines; to form a direct



exhaust-passage from the high-pressure to the low-pressure steam-chests; to provide a simple by-pass valve of sufficient capacity to enable a free and unobstructed flow of high-pressure steam to low-pressure cylinders by the simple movement of a lever—a by-pass valve of sufficient capacity to relieve the cylinder from producing a vacuum, as is liable by a locomotive-engine when running without using steam, and thereby obviate the necessity of using vacuum-valves.

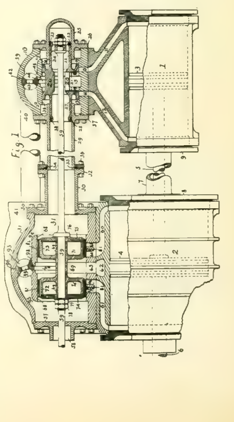
My invention is illustrated in the accompanying drawings, shown as a tandem multiple-cylinder locomotive, wherein many of the features are equally as effective and as well adapted to stationary and other engines and also to simple or single expansion engines.

Steam-Engine

No. 679,950.

HENRY F. COLVIN, of Philadelphia, Pa.

The object of the invention is to construct a multiple-cylinder engine employing piston-valves and wherein the valves



do not have packing-rings which pass the port edges and the steam-chests do not have to be bushed or the ports bridged or gridironed to prevent the packing-rings dropping into them or catching upon their edges. I also connect the steam-chests of my engine for free exhaust-passage with telescoping sleeves so arranged as to permit the free inspection of the packing-rings employed by simply unbolting the steam-chest covers. The valves are conneted through and within the sleeves, and only one stuffing-box is necessary for the valve-stem. There are also by-pass valves provided, which by their use enable the flow of live steam into all cylinders, and by the simple movement of connected arms and their further continuous movement the by-pass valves, which are of sufficient capacity to permit free fluid flowing from end to end of the cylinders to prevent creating a vacuum when the engine is running without steam, thereby obviating the necessity of employing relief-valves. The low-pressure cylinders are also provided with double ports at the steam-chest end, one being for inlet and one for outlet, and the steam-chests are secured to the cylinders on flat seats to facilitate construction and renewal.

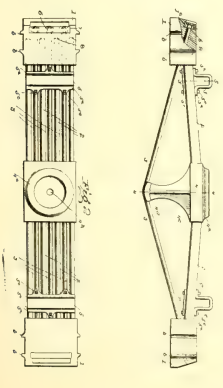
Car Bolster

No. 680,512.

CHARLES H. WILLIAMS, JR., AND GILBERT P. RITTER, of Chicago, Ill.

The invention relates to the construction of composite metallic bolsters for railway cars, and has for its object the production of a composite metallic bolster wherein the tension and compression members are so relatively arranged as to avoid slotting or weakening of the members and to obtain the maximum strength or carrying capacity with the minimum of metal.

To this end the main feature of the invention consists in the combination, in a trussed bolster, of a plurality of independent tubular compression members with a plurality of tension members, the axes of the compression and tension members arranged in different vertical planes, preferably alternating, whereby the structure may be assembled and combined without impairing the structure of the compression members and without weakening the same.



A secondary feature of the invention resides in the combination, in a trussed bolster, of a plurality of independent spaced compression members and a plurality of tension members, the tension members being unequal in numbers and the tension members alternating with the compression member, whereby a stiff and symmetrical bolster is secured.

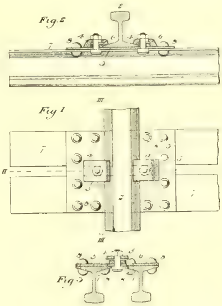
Metallic Tie

No. 677,754.

ARTHUR M. BOWMAN, of Bellevue, Pa.

The invention is designed to afford a cheap, durable, and efficient article made up of commercial shapes.

The body of the tie I form of two ordinary T rails set parallel to each other and inverted, thus presenting flat surfaces for the support of the tie plate 3, secured thereto by rivets 8. Rails 7 7 are set at sufficient distance apart to permit the insertion of the heads of bolts 5 5 between their flanges, thus affording means for securely retaining such heads and obviating the necessity of cutting rails 7 7 for the passage of bolts 5 5. It will be apparent that there will be a reduplication of the parts, as shown in Fig. 1, to provide for the other rail.



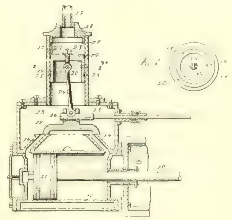
The advantages of my invention will be appreciated by those skilled in the art, since it affords a simple and durable metal tie, the cost of which is small, and by reason of the lateral extension of the tread of rails 7 7 it may be more securely anchored in the bed than with hitherto known ties, and the separation between the upper flanges allows effective ballasting, and, further, the tread being placed downward in the roadbed affords a better anchorage therein.

Balanced Valve

No. 679,755.

JOHN A. JOHNSON AND ELMER O. HENDERSON, of Okoboji, Iowa.

This invention relates to that class of balanced slide-valves in which the steam-pressure within the steam-chest which operates to hold the slide-valve against its seat with great force is balanced by means



of a piston or pressure-plate, against which the steam presses in a direction opposite from that of its pressure upon the sliding valve, and which piston or pressure-plate is connected with the slide-valve. Heretofore in devices of this class it has been found necessary to provide the balancing-piston with some sort of a guide to prevent the lateral pull of the slide-valve upon the balancing-piston from causing the piston to cut into the cylinder, and former devices of this class have been objectionable, further, on account of the inability to adjust the position of the balancing-piston within the cylinder. Hence when the cylinder has become worn at one point by the travel of the piston the entire device is rendered useless.

The objects are, first, to provide a device of this class in which a piston in the form of a hollow cylinder is used and the piston is conneted with the slide-valve by means of a link pivotally connected with a bolt that is adjustably secured to the end of the piston, whereby the said pivotal point may be placed in any desirable position with relation to the transverse center of the piston that may be found most favorable for preventing lateral movements of the piston, and, further, in this connection, to provide a device of this class in which the path of travel of the piston may be transferred from one point to another throughout the cylinder at the will of the operator.

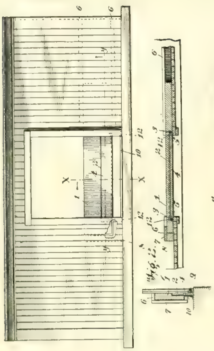
Grain-Car Door

No. 680,132.

WILLIAM H. DANIELS, of Duluth, Minn.

This invention relates to improvements in grain-car doors, and has particular reference to that form of door which is provided with a supplementary independently operated section.

One of the objects of the invention is to provide means for relieving the great pressure of the grain upon the main door before operating the same, whereby the parts are prevented from breaking and relieved from liability of strain.



Another object of this invention is to provide a car-door which shall operate freely, shall prevent any loss of grain from leakage, and shall permit the removal of the grain from the car with a minimum of waste.

With these objects in view it consists of a vertically-sliding section operating within a horizontally-movable door, whereby upon raising the vertically-moving section to its uppermost position grain may escape beneath the main door and relieve the pressure upon the same.

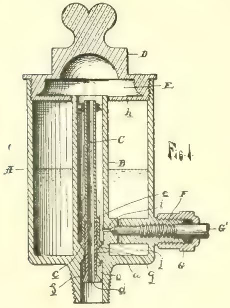
It also consists of a main door, a supplemental door moving within the main door, and a hinged door-sill adapted to bear against the supplemental door when in its lowered position and to assume a horizontal position whereby the grain may be guided to a receptacle outside the car when said supplemental door is raised.

Lubricator

No. 679,560.

ROY E. HARDY, of Detroit, Mich.

The invention relates to new and useful improvements in lubricators, and refers more particularly to that class wherein the pulsation of pressure is utilized to actuate the lubricator-valve, and has for its object to make a lubricator more especially adapted for use in connection with gas or gasolene engines; and to this end the invention consists in so constructing a lubricator that a predetermined quantity of oil will be fed to the engine-cylinder at each explosion, and consists further, in the use of a tubular plunger-valve within the oil-supply pipe in constant communication with the air space of the cup and the part to be lubricated and in the provision of a diaphragm across said cup to form a closed air-space above the oil-space and at the same time keep the products of combustion from contaminating the oil.

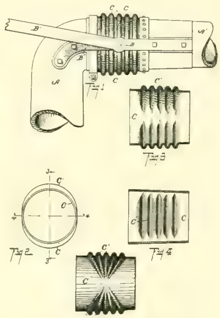


Stand-Pipe

No. 680,328.

JAMES HENDERSON, of Three Rivers, Mich., assignor to the Sheffield Car Co.

This invention relates to improvements in flexible joints for stand-pipes, and particularly to stand-pipes for locomotives. With the straight rubber tube or cylindrical connection in the pipe the raising or lowering of the horizontal portion of the pipe tends to cut off the flow of the water and reduce the capaity of the pipe, and also the pipe is not easily moved to position. It is necessary also to provide a pivotal support for the metallic portions of the pipe, and therefore necessary and very desirable that the connections should yield sufficiently to permit the pipe to swing up and down.



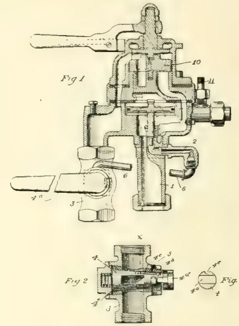
It is the object of my invention to provide a structure which accomplishes these results permitting the easy and free movement of the pipe without restricting the passage and at the same time provide a structure which is durable.

Cut-Out Cock for Engineers' Brake-Valves

No. 678,596.

JEFF D. VAN ATTA, of Millersburg, Ohio.

In what is called "double heading"—that is, where two locomotives are coupled to draw a train—the engineer of the forward engine does the "braking" and the engineer's brake valve of the rear engine is "cut out." Heretofore in such circumstances it has not been practicable for the engineer of the cut-out engine to observe the degree of pressure and variations of pressure in the train pipe, and if it became expedient that he assist in the working of the brakes or in recharging the train pipe he was ignorant as to what might be done or as to what to do. For example, if through necessity or accident the engineer of the forward engine should allow his train pipe or reservoir pressure to fall below the minimum, so as to render impracticable the proper application of the brakes, the engineer of the rear engine would not be aware of the fact.



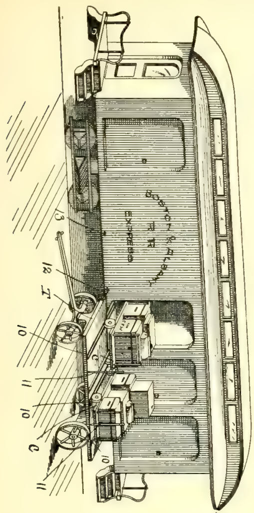
The object of the invention, therefore, is to provide the engineer's brake valve with a cut-out cock and connections that can be manipulated to cut off communication of the main reservoir with the engineer's brake valve and at the same time establish communication of the train pipe exhaust with the upper side of the rotary valve in the engineer's brake valve, permitting the state of the train pipe pressure to be observed at the usual gauges, so that if the engineer of the rear engine observes that it is necessary or expedient he can reopen temporarily this cut-off cock and recharge the train pipe and auxiliary reservoirs.

Means for Handling Baggage

No. 679,567.

ARTHUR H. LOWE, Fitchburg, Mass.

The essential object of my present invention is to provide an improved apparatus for loading and unloading baggage which will not require the separate handling of each individual piece of baggage, which will permit all baggage which is to be loaded into the car to be pushed into the car at a single operation, and which will permit all baggage which is to be put off a car also to be drawn out of the car at a single operation. To accomplish this object, I employ movable baggage carriage carriers or crates which preferably have sufficient capacity to hold all baggage to be loaded on at any station, and I combine the baggage carriers or crates with a truck which can be moved to position along the side of a car and preferably secured thereto, so that the transverse tracks or ways of the truck will reg-



ister with the tracks or ways extending inside the car and with those on the skid or movable piece which may be employed for connecting the car with the truck, so that a loaded baggage-carrier containing the baggage to be put on the car may be pushed into the car at a single operation and a baggage-carrier from inside the car containing the baggage to be put off may be drawn out at a single operation. This transfer of a considerable quantity of baggage at a single operation may be accomplished so speedily that the express-passenger trains may be operated on shorter schedule times and the baggage transferred with less labor than where each individual piece of baggage is handled.

Axle-Lubricator

No. 680,388.
THOMAS HENRY McCAULEY, of Port Arthur, Canada.

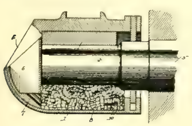


Fig. 2.

Fig. 3.

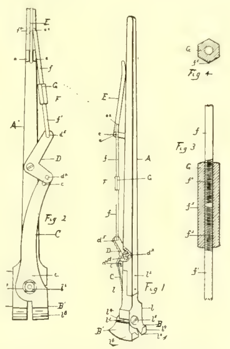
An elastic car-axle-box packing comprising a length of wire forming a core and pieces of absorbent material strung on the said core, the relative dimensions of said core and said packing material being such as to adapt said packing to be bent and doubled upon itself and crowded into car-axle box so as to bear against the journal of the axle.

A car axle box having a removable closure in its outer end, and bearing against the outer end of the axle-spindle, said closure being adapted to bear against packing material in the said car-axle box and prevent said material from being displaced from under said spindle, said closure forming an oil-receptacle and being perforated to feed oil to the packing.

Spike-Extractor

No. 680,300.
ELMER E. WELSH, of Lawrence, Kan.

In an implement for extracting spikes, etc., the combination with separate fixed and movable spike-grasping jaws of a main operating-lever connected with the body of the fixed jaw and vibrating lever connected with the body of the movable jaw lugs rigidly connected with one side

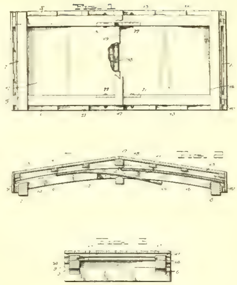


of the main lever and extending outwardly therefrom and a power-conveying lever pivotally connected, at its lower end with the outer ends of said lugs a bell-crank lever on the main lever pivotally connected with the vibrating lever and separate rods adjustably connected with each other one of which rods is pivotally connected with the bell-crank lever and the other rod with the power-conveying lever and having its pivotal end concentric with the fulcrum of said power-conveying lever and movable in the arc of a circle past said fulcrum in the direction of the main operating-lever.

Car-Roof

No. 679,801.
JOSEPH E. ULSH, of Altoona, Pa.

This invention relates to car-roofs; and it has for one object to provide a roof including metal plates and in which said



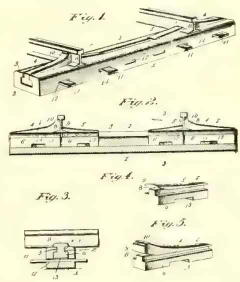
metal plates may be applied and removed from the inside of a car and without removing any of the roof-timbers or frame, a further object of the invention being to provide a construction and arrangement wherein leakage will be prevented while water and dirt will be carried outwardly and off from the roof of the car.

Railroad-Tie

No. 680,460.
FRANK MINGLER, of Leetonia, O.

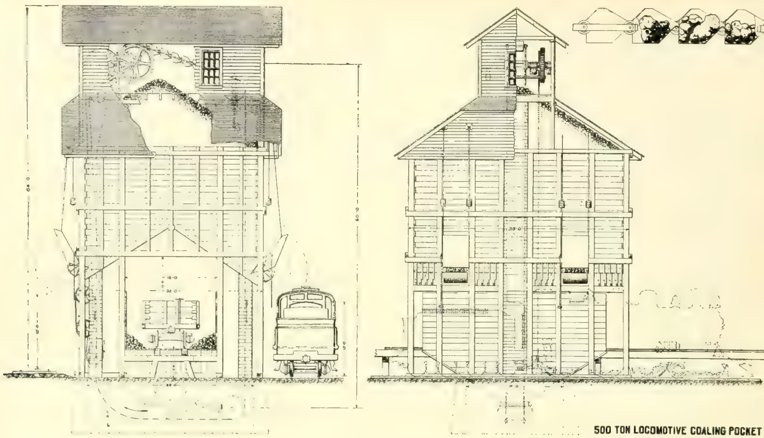
This invention relates to railroad-ties, and has special reference to that type of ties known as "metallic" ties and with which are directly associated the rail-fastening means or devices.

To this end the invention has in view the provision of a simple and practical construction of tie and improved rail-



fastening means carried by the tie and so constructed as to provide for firmly holding the rails in position, while at the same time permitting of the ready release of the rails whenever this may be necessary for purposes of adjustment or in laying new rails.

A further object of the invention is to provide an improved form of tie and rail fastening devices which adapt the invention for all conditions of rail-laying, the same being equally as useful for switch and frog work, as well as for single-track purposes.



500 TON LOCOMOTIVE COALING POCKET
LAKE SHORE & MICHIGAN SOUTHERN RY.

Locomotive Coaling Plant, Lake Shore and Michigan Southern Ry.

The type of coaling station here shown is one that has been equipped by the Link-Belt Machinery Company, of Chicago, an example of which is situated at Butler, Ind. Such stations are also to be found at some points on the New York Central Railroad and on the B. & O. Southwestern at Cincinnati and Washington, Ind. It is especially adapted for localities where locomotives are coaled on two tracks which can be spaced sufficiently far apart to allow of the station being placed between them; the coal supply track being in the center and running through and beneath the station. From four to six hundred tons of coal may be carried in the storage pocket, or enough for two or three days' supply or longer, according to the number of engines coaled daily. No provision is made for measuring or weighing the coal as supplied to the tenders.

The coal is received on the supply track, either in gondola side-dump or bottom-dump cars, is delivered to the hopper beneath this track. Encircling this hopper and the overhead storage pocket, is a Link-Belt Carrier (shown in the illustration) and to this carrier the coal is fed automatically and at a perfectly uniform rate by a patented loading mechanism which reciprocates between the hopper and the carrier. By the inversion of the carrier buckets in passing over the head wheels, the coal as elevated runs from them into the hopper. The carrier is of a type especially designed for this work and consists of heavy steel buckets, 36 x 24 inches in size, attached between heavy steel chains, these chains being fitted with self-oiling rollers which support the buckets, and, travelling on rails, guide the carrier in its path. The size of the buckets and the use of the automatic reciprocating loader make possible the handling of bituminous coal of any size directly as it comes from the mine.

One of the features of the plant is the gate and chute for delivering coal from the pocket to the tender. The pockets are provided with balanced gates which cannot clog and which enable a man to regulate, perfectly, the flow of coal from the pocket to the balanced apron delivering it to the tender. These gates are of the Link-Belt Patent Under-cut type, the gate rising from below instead of coming down upon the coal. A number of these have been supplied to locomotive coaling stations of old fashioned types, on the Chicago & Northwestern Ry., and other lines.

The Prairie Car Door Fastener.

Box car ventilation is a live topic in the railway world nowadays. Apropos of Mr. H. H. Perkin's address to the Central Railway Club on this subject, a resume of which appeared in the August *Digest* (page 310). The J. S. Toppan Co, of New York and Chicago, has placed a new style of car

THE PRAIRIE CAR DOOR FASTENER SEALED

door fastener on the market. It can be used on regular or bonded cars, the hasp having a provision for use when car contains bonded freight where a lock is used. The hasp is so arranged that the car door can be left partly open for ventilating purposes, yet the car is always securely sealed.

The Prairie Car Door Fastener, as it is called, precludes the possibility of opening the car door without breaking the seal or destroying the lock. It is said to be as nearly burglar

AS USED ON BONDED CARS WITH LOCK.

proof as any car seal can be made. It is easily sealed, and the lettering on the seal is always in a position where it can be seen.

The Toppan Company will send a sample lock upon application. Address 77 Jackson Building, Chicago, or 26 Cortlandt street, New York City.

PERSONALITIES

Charles M. Hays, president of the Southern Pacific, has tendered his resignation. Mr. Hays' action is due to a change in ownership of the property. He became president of the Southern Pacific on January 1, last, under a five-year contract.

P. W. Johnstone has resigned as superintendent of motive power and machinery of the Mexican Central, but will remain in charge of the office until his successor is appointed. Mr. Johnstone will open an office at the City of Mexico, as consulting engineer, and will be associated with Rafael M. de Arozarena. Mr. Johnstone has been connected with the Mexican Central as master mechanic and as superintendent of motive power and machinery for twenty years.

William B. Sharpe, who was until recently with the Patterson Sargent Company, of Cleveland, has become connected with the Joseph Dixon Crucible Company of Jersey City. He will have his headquarters at the Chicago office of the company in the Monadnock block, and will look after the railway trade in the West.

E. A. Benson, manager of the Pullman Car Company's shops, at East Buffalo, N. Y., has been appointed mechanical superintendent of all the shops of the Pullman Company, with headquarters in Chicago. John Budge, superintendent of the Pullman works, at Wilmington, Del., will succeed Mr. Benson at the East Buffalo plant.

H. M. Perry, of Chicago, has been appointed master car builder of the Algoma Central R. R., with headquarters at Sault Ste. Marie, Ontario.

A. E. Mitchell, mechanical superintendent of the Erie, will remove his headquarters from New York to Susquehanna, Pa.

H. Monkhouse has resigned as superintendent of motive power of the Chicago, Indianapolis & Louisville, to accept a position with the Compressed Air Company, of New York, and John Gill, master mechanic of the Chicago, Rock Island & Pacific, at Trenton, Mo., has been appointed to succeed him on the C. I. & L., with headquarters at Lafayette, Ind. Mr. Monkhouse has been with the Monon since July, 1900.

G. W. Scott, who, for the past five years, has been mechanical engineer of the Pullman Car Company, has opened an office at 616 Rookery, Chicago, as a consulting engineer, and announces that he will conduct a general engineering practice. A long and varied experience amply qualifies Mr. Scott to render valuable service in his professional work.

H. G. Cummins, who has been chief clerk of the traffic department of the Schwarzschild & Sulzberger Packing Co., and Cold Blast Transportation Co., for several years, has been appointed manager of the National Brass Mfg. Co., of Kansas City, Mo.

A. M. Knapp, for the past eight years general foreman and joint car inspector at Portland, has been appointed general foreman, car department, Southern Pacific Co., Oregon lines, effective August 1. Mr. Knapp succeeds D. F. Knapp, who has been transferred to another division of the Southern Pacific Co. A. M. Knapp is succeeded by T. H. Osborn, of Pine Bluff, Ark.

R. P. C. Sanderson, formerly assistant superintendent of motive power of the Norfolk and Western, has been appointed purchasing agent for the Seaboard Air Line system. Mr. Sanderson was in the mechanical department of the Atchinson when Vice-President Barr, of the Seaboard, was vice-president of that system.

W. Gratz, E. E., who has been connected with the International Correspondence Schools, Scranton, Pa., has resigned to accept a position with Elmer G. Willyoung, New York, maker of electrical measuring instruments. I. McC. Bean, formerly of the Dickson Manufacturing Company, has succeeded Mr. Gratz as editor of *Science and Industry*.

OBITUARIES

John Lucas, founder and head of the firm of John Lucas & Co., paint manufacturers of Philadelphia, died at Atlantic City, N. J., on August 7. Mr. Lucas first started in the paint manufacturing business about 1850 under the firm name of Gibbsboro Paint, Color and Varnish Works, and continued in this line of work until the time of his death. Mr. Lucas was at one time a director and president of the Camden & Atlantic Railroad. For the last ten years he had been a sufferer from Bright's disease and heart trouble, and at the time of his death was 78 years old.

P. C. Ewart, for many years chief clerk to the secretary of the Central Association of Railroad Officers, died at Cincinnati, Ohio, August 19.

Railroad Day at the Pan-American

Senator Chauncey M. Depew has accepted an invitation to deliver the principal address at the Pan-American Exposition on Railroad Day, the date of which has been changed from September 13 to Saturday, September 14. The exercises will occur at 2.30 o'clock, on the exposition grounds.

If anything were needed to assure the success of this special event in the history of the exposition, it has been afforded in the fact that Mr. Depew will be the orator of the day. His address will be that of a railroad man to railroad men. His familiarity with railroad life and its varied phases and his great capacity at all times to be entertaining and instructive will undoubtedly make it the most notable of the exposition season.

MISCELLANEA

Universal Car Bearings have been specified for 1,000 gondola cars of 80,000 pounds capacity, being built for the Erie by the Pressed Steel Car Company; also for 1,000 60,000-pound box cars for the Cotton Belt, and for 60 engines being built by the American Locomotive Company for the Great Northern.

The plant of the Simplex Railway Appliance Company at Hammond, Ind., was destroyed by fire on Friday, August 2. The day after the fire 150 men were at work clearing up the debris and the new buildings are now rapidly being completed.

C. B. Hutchins & Sons, Detroit, Mich., manufacturers of car roofs, have opened an office in Chicago at 827 Monadnock building, in charge of S. D. Anderson, as general sales agent.

The Consolidated Railway Electric Lighting & Equipment Co. invites persons visiting the Pan-American Exposition, at Buffalo, N. Y., to inspect the company's "Axle Light" system of electric lights and fans for passenger cars, in operation on the Lackawanna Railroad exhibit in the Transportation building, and also on the Atchison, Topeka & Santa Fe Rilway composite car, "San Rafael," located at the east end of the Transportation building, on a track reserved for private cars of railway officials.

The Barber car truck, made by the Standard Car Truck Company, of Chicago, is being put into service to a very large extent by various railroads. It has recently been specified, among other orders, for the following equipment ordered to be constructed by the railroads named: 1,100 box cars ordered by the D., L. & W. R. R., of the American Car & Foundry Company; 1,000 gondola cars, Erie Railroad, Pressed Steel Car Co.; 1,000 box cars, C. M. & St. P. Ry., and 10 locomotive tenders, B. & O. R. R., to be built by the American Locomotive Company, at Richmond, Va.

The Pressed Steel Car Company recently made another (the third) shipment of steel cars to South Africa for the Zululand Railway. The shipment consists of 10 flat cars of 50,000 pounds capacity.

One of our notices of convention exhibits last month, referred to the Morse Employer's Time Recorder, which is made by the American Watchman's Time Detector Company, 234 and 235 Broadway, New York City. The exhibit comprised not only the employer's time recorder, but the magneto system for Watchman's clock, which operates without battery. These specialties, together with the company's electric time system and interior telephones, are on view at the Pan-American Exhibition and are to be found in the Electricity Building. Mr. J. S. Morse, treasurer of the company, has just completed three large contracts with the American Locomotive Company for installations at Richmond, Schenectady and Patterson.

The annual meeting of the Chief Joint Car Inspectors' Association will be held at the Great Northern Hotel, Chicago, on the 19th inst.

Record of New Equipment

Ordered during the Month of August, 1901

CARS

Ordered by	No.	Class.	To be built by
Am. Reft. Trans Co.	100	Ref.	
Anglo-Am. Prov. Co..	100	Ref.	Own Shops.
A. T. & S. F........	750	Ref.	Am. Car & F. Co.
Anheuser-Bush Co....	1	Private	Pullman Car Co.
Bangor & Aristook...	16	Pass.	Am. Car & F. Co.
Blackwell Enid & So'west'n	100	Box	Am. Car & F. Co.
Canadian Pacific......	177	Flats	Own Shops
Canadian Pacific.....	275	Box	(30 T) Own Shops.
Canadian Pacific.....	300	Box	(40 T) Own Shops.
Can. Northern	100	Box	Crossin Co.
Can. Northern........	500	Box	Ill. Car & Eqt. Co.
Cal. & Northwest'n...	6	Pass.	Pullman Car Co.
Canton & Akron......	8	Motor	St. Louis C. Co.
Chicago Gt. Western..	4	Chair	Pullman
Chicago Gt. Western..	4	Comb.	Am. Car & F. Co.
Chicago & Alton.....	2	Chair	Am. Car & F. Co.
C. M. & St. P.........	2	Parlor	Pullman
Cin. New O. & Tex. Pac.	50	Stock	Own Shops.
Cin. New O. & Tex. Pac.	1	Cafe	Am. Car & F. Co.
Cin. Rich. & Muncie.	109	Cars	Laconia Car Wks.
Chic. & Northwest'n.	100	Cars	Own Shops.
C. C. C. & St. L....	100	Coal	Own Shops.
Cold Blast Ref. Trans.	100	Ref.	Am. Car & F. Co.
D. L. & W. R'd.......	1000	Box	Am. Car & F. Co.
Fla. East Coast......	4	Parlor	Am. Car & F. Co.
Fla. East Coast......	10	Pass.	Am. Car & F. Co.
Fla. East Coast......	6	Exp.	Am. Car & F. Co.
Grand Rap. & Ind...	100	Coal	Am. Car & F. Co.
Govt. Rys. Austria....	200	Cars	Pressed Steel Car Co.
Hamburg Rushton & So.	1	F. C. Pass.	Am. Car & F. Co.
Hamburg Rushton & So.	1	F. & S. P	Am. Car & F. Co.
Hamburg Rushton & So.	1	Comb.	Am. Car & F. Co.
Hamburg Rushton & So.	5	Flats	Am. Car & F. Co.
Hammond Iron Wks..	5	Cars	Am. Car & F. Co
Inter Colonial (Canada	250	Cars	Crossin Co.
Inter Colonial (Canada)	50	Box	Rathbun Co.
Inter Colonial (Canada)	500	Cars	Rhodes Curry Co.
K. C. Ft. Scott & Mem.	200	Coal	Am. Car & F. Co.
Louisville & Nashville	200	Cars	Own Shops.
Louisville & Nashville	400	Coal	Own Shops.
Louisville & Nashville	2	Pass.	Own Shops.
L. S. & M. S.........	25	Ballast	Rogers Balast Co.
L. Erie, All. & Whlg..	—	Coal	Am. Car & F. Co.
Manufacturers' Ry...	1	Private	Pullman
Manhattan L........	400	Motor truck	Am. Car & F. Co.
Macon Dublin & Sav.	5	Pass.	Am. Car & F. Co.
McCaw M'f'g. Co.....	10	Cars	Am. Car & F. Co.
Mich. Chem. Wks....	10	Cars	McCaw Mfg. Co.
Mo. Pacific............	1000	Coal	Am. Car & F. Co.
Mexican	4	Pass.	Harland & Holingsworth.
Norfolk & West'n....	500	Box	Own Shops.
Norwood & St. L......	2	Cars	Am. Car & F. Co.
Norfolk & So'th'rn...	25	Cars	Am. Car & F. Co.
New Orleans &Nor'n..	1	Cafe	Am. Car & F. Co.
Northwest'n Elevated.	15	Motor	St. Louis C. Co.
Northwestern Elevated	45	Trailer	St. Louis Car Co.
Ozark & Cherokee Cent'l	2	Pass.	Barney & Smith.
Ozark & Cherokee Cent'l	50	Box	Barney & Smith.
Ozark & Cherokee Cent'l	10	Flat	Barney & Smith.
P. & C. Grason Co'y.	10	Cars	American Car & F. Co.
Penna. R'd...........	400	Box	Own Shops.
Penna R'd............	1250	Box	Pressed Steel Car Co.
Penna R'd............	750	Box	Am. Car & F. Co
Paris & Orleans (France)	100	Coal	Am. Car & F. Co
Paragon Ref'g Co...	20	Tank	Erie Car Wks.
Pittsburgh Oil Ref. Co.	11	Tank	Erie Car Wks.
Queen & Crescent....	1	Mail	Am. Car & F. Co.
Robsonia	10	Cars	Laconia C. Wks.
So. Pacific............	1	Private	Pullman.
So. Pacific...........	500	Tank	
So. Pacific............	75	Bridge gang	Roberts Car Wks.
So. Pacific............	1	Gordon spre'l	H. H. McDuffee.
Southern Ry..........	1	Cafe	Am. Car & F. Co
Southern Ry..........	100	Box	Am. Car & F. Co
St. Louis & San Fran.	14	Box	Am. Car & F. Co
St. Louis & San Fran.	100	Coal	Am. Car & Fdry. Co.
St. Louis & San Fran.	100	Comb.	Am. Car & Fdry. Co.
St. Louis K. C. & Cal.	25	Flat	Mt Ver. Car Mfg. Co.
St. Louis K. C. & Cal.	1	Private	Pullman.
So. Missouri & Ark..	2	Bag	Pullman
So. Missouri & Ark..	2	Pass.	Pullman.
So. Missouri & Ark..	2	Comb.	Pullman.
So. Indiana...........	500	Cars	Barney & Smith.
San Pedro Los Ang. & Salt Lake...........	15	Misc.	Pullman Car Co.
Westmoreland Coal Co	1	Coal	Middleton Coal Co.

LOCOMOTIVES

Ordered by	No.	Class	To be built by
A. T. & S. F....... .	5	Comp. 10-W	Baldwin Loco. Works.
A. T. & S. F..........	40	Prairie	Baldwin Loco. Works.
Aquas Blancas (Bolivia)	2	Cons'l'n.	Rogers Loco. Works.
Autofogasta Ry. Peru.	2	Locos.	Rogers Loco. Works.
Bismark Washb'n & Gt. F'ls.	1	Locos.	Baldwin Loco. Works
Chicago Gt. West'n...	20	Prairie	Am. Loco. Co.
Chicago Gt. West'n...	1	Vand'blt.	Am. Loco. Co.
C. C. C. & St. L.....	10	Locos.	Am. Loco. Co.
C. R. I & P..........	1	Prairie	Am. Loco. Co.
C. R. I. & P.........	12	Pass.	Am. Loco. Co.
C. R. I. & P.........	17	Frt.	Am. Loco. Co.
Central of Brazil....	6	Locos.	Baldwin Loco. Works.
Canadian Pacific	1	Shay	Lima Loco. Works.
Elgin, Joliet & Eastern	2	Switch	Baldwin Loco. Works.
Elgin, Joliet & Eastern	10	Cons'l'n.	Baldwin Loco. Works.
El Paso & Northeast'n	1	Shay	Lima Loco. Works.
Hocking Valley	5	Cons'l'n.	Baldwin Loco. Works.
Iron Ry.	1	Locos.	Baldwin Loco. Works.
Ind. Ill. & Iowa......	2	Comp.	Baldwin Loco. Works.
Ind. Ill. & Iowa......	2	Switch	Baldwin Loco. Works.
Maryland & Penna....	3	Pass. 8-W.	Am. Loco. Works.
Mexican Central	15	Cons'l'n.	Am. Loco. Works.
Mexican Central	8	Switch	Am. Loco. Works.
Mineral Range................	2	6-W.	Rogers Loco. Works.
Mineral Range	4	Cons'l'n.	Rogers Loco. Works.
Nash. Chat & St. L..	7	Cons'l'n.	Baldwin Loco. Works.
Nash. Chat. & St. L..	5	10-W.	Baldwin Loco. Works.
Nash. of Tehauntepec.	1	Loco.	Baldwin Loco. Works.
Oregon Short Line....	1	Shay	Lima Loco. Works.
Plant System........	1	Loco.	Baldwin Loco. Works.
St. L. & Kansas City	3	10-W.	Baldwin Loco. Works.
St. L. Southwest'n...	10	Locos.	Rogers Loco. Works.
So. Mo. & Ark........	2	8-W.	Am. Loco. Works.
Suffolk & Cal........	1	8-W.	Baldwin Loco. Works.

Oiled Roadbeds

When the tracks of the Boston & Maine were first oiled, as an experiment, in 1899, it was thought that after three annual applications the dust would be so well laid that no more work would need to be done for seven or eight years. Although it has taken less oil per mile each year, Assistant Manager Barr expects that sprinkling will have to be an annual affair if the roadbeds are to be kept in the best condition. On the first application the company was obliged to use from 3,000 to 3,500 gallons of oil; but on the second application from 2,500 to 3,000, and this year, on the third application, from 2,000 to 2,500 gallons are sufficient.

A locomotive fitted with the Vanderbilt patent firebox and tender attracts considerable attention in the railway exhibit building at the Pan-American Exposition. It is the first of a line of three locomotives in the exhibit of the Baldwin Locomotive Works. The engine is a 4-6-0 type. It weighs one hundred and forty-nine thousand pounds, and is to be used on the Illinois Central Railroad. The boiler on this engine is the fifteenth, and the tender the first, of this patent, used in equipping an engine.

The Eleventh Annual Convention of the Association of Railway Superintendents will be held at the Kimball House, Atlanta, Ga., October 15 to 17. Interesting reports will be presented for discussion and a profitable time is promised. At the close of the session a trip to Miami, Florida, has been arranged for by the entertainment committee. A cordial invitation is extended to all railroad officials interested in the aims and purposes of the Association, to attend the sessions of the convention.

The ninth annual convention of the Traveling Engineers' Association will be held at the Continental Hotel, corner of Ninth and Chestnut streets, Philadelphia, Pa., commencing at 9 A. M., September 10, 1901.

The Chicago, Burlington and Quincy Railroad has abolished the "train butcher," as the persistent train boys are called in railway parlance.—*Railway and Engineering Review.*

RAILROAD DIGEST

Formerly The Railroad Car Journal

ENTERED AT THE NEW YORK POST OFFICE AS SECOND CLASS MATTER.

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EDWARD A. PHILLIPS GEORGE S. HODGINS, Editors

Vol. XI OCTOBER, 1901 No. 10

William McKinley

President of the United States

Born Jan. 29, 1843, Died Sept. 14, 1901

"Hath borne his faculties so meek,
Hath been so clear in his great office,
That his virtues will plead like angels, trumpet-tongued, against
The deep damnation of his taking off."

Macbeth, Act 1, Sc. 7.

Locomotive Classification

At the September meeting of the Central Railway Club a report on locomotive classification was presented. The committee said it could not offer, for adoption, any plan which would be of practical value. With all possible respect, we think it is a mistake to look at the question from the highly technical motive power standpoint, or to defer action on the ground that existing methods of classification would have to give way to a new formula. We differ with the report of the Central Railway Club, and think that the vital point in this matter has been missed. The report side-tracks the real question, and obscures what politicians would call the paramount issue.

The plan to be adopted should indicate the type or wheel arrangement, and might give, if desired, other particulars yet to be decided upon. The formula should be compact, capable of easy verbal or written expression, and it should require no great mental effort to grasp or use it. The central idea, in working out the general arrangement, should be, not to upset methods of classification now in vogue on railways, but to present a scheme which can be readily used by all who require to designate, in a general way, the existing types.

In 1879 J. M. Schleyer, of Constance, in Germany, invented a universal language, which he called Volapuk. This "world speech," as the name suggests, was intended to facilitate communication between different nations, but that did not imply the obliteration of even a single local dialect. A new universal classification of engines would be decidedly advantageous, and it need not interfere with existing conditions.

For the sake of illustration, suppose the Rock Ballast & No Dust Railway calls an Atlantic type engine its 5-H class. The new formula would not affect that local method in any way, but to tell people not familiar with that particular system, that fast passenger trains were being hauled by 5-H engines would be to give information more concise than intelligible.

In the *Railroad Digest* for April, 1901, a chart of locomotive types was published. There are in that chart two types which, for want of accepted names, were arbitrarily christened "St. Paul" and "Calumet." One because it was used on the St. Paul road, and the other by the Chicago and Calumet Terminal Co. Neither of these names indicate the type, they are as vague as the 5-H class mentioned above. They will continue to be thus vague, unless incorporated, by common consent or by official action into our technical vocabulary. One of these engines has a four-wheel truck, six drivers, and a pair of carrying wheels at the back. The problem is, to how to describe this engine so that people unfamiliar with the C. M. & St. P. system will receive a fairly good mental picture of the machine. One way is to call it a 4-6-2 type. That, at least, gives the wheel arrangement. Whether this is satisfactory, and what more is required, are questions yet to be decided. The companies owning these two types, may use a form of classification which perhaps indicates several features of construction, but their methods, whatever they may be, are not touched by the statement that the "Calumet" is a 2-8-2 type.

The desired formula should be capable of general application, and should be over and above the particular scheme used by any railway company. The end in view should be a classification which could be used in describing, with a fair degree of accuracy, not only our own engines, but also those in Great Britain and on the Continent. Information required by transportation officers should be given by each railway for its own use. What is wanted is a 'Volapuk' classification, which will cover general features, for all to use.

The first requisite, in this matter, is not to devise the new formula, but to decide what we want to express. If, by means of discussion, in the railway clubs, and through the technical press, that point could be agreed upon, the construction of a formula would easily follow.

Stencilling Capacity on Cars

At the July meeting of the Car Foremen's Association of Chicago, Mr. Mullally read a paper on the proper method of stencilling capacity and light weight upon cars. The *Railway Master Mechanic*, in its published account of the meeting, August issue, gives two half-tones, showing parts of cars, one indicating the proper method, and the other the improper method of doing this work. Although concerned with where and how to paint the figures, the interesting feature about these illustrations is that one of them shows part of the word, "Refrigerator," on a car, and the other includes enough of the lettering on the side of another car, to show the suggestive words "— Grower's Express." One is tempted to believe that the cars which happened to be selected, belonged to private lines, and a train of thought is thus suggested.

The stencilling of "Capacity" on cars, was, some years ago, considered necessary, and a rule to that effect was placed in the code of interchange, by the M. C. B. Association. Like many other enactments of that body, no penalty was attached for non-compliance by owners, and no incentive was offered to others, to do the work. The result was that a certain number of private lines paid no attention to it, and some, be believe, still ignore it.

Napoleon is reported to have said that a blockade to be respected, must be effective. It is precisely the same with the M. C. B. rules. If a rule is not enforced, it might just as well have been left out of the code. The rules state the minimum size of axles for each given capacity of car. Without the capacity stencilled on the car, an inspector cannot determine if the axles under it are within the prescribed limits. When a man notes the capacity of a car, and in connection therewith measures and examines the sizes of the axles, he is performing a most important part of his duty. This is, most emphatically, "Inspection for safety only," and its value cannot be overstated.

Viewed in this light, and it is a perfectly reasonable view to take; the placing upon a car, the figures representing its capacity, is in reality as much a "safety appliance," as grab irons or automatic couplers may be. As such, the matter

might very properly come within the purview of the Interstate Commerce Commission.

Size of axle, and capacity of car are two items in car construction and operation, which are bound together by a carefully pre-determined ratio, which has been stated authoritatively by experts. The object for which the two are to be considered in connection with each other, is safety, pure and simple! In the interests of safety, therefore, the stencilling of capacity on all cars should be rendered obligatory.

Why Not Mark them all, "A" and "B"?

Rule 3, Section 1, of the M. C. B. Code of Interchange rules, now in force, reads, "The end of the car upon which the brake staff is located shall be known as 'B' end, and the opposite end shall be known as 'A' end. Where there are two brake staffs on the same car, the end toward which the cylinder push rod travels shall be known as 'B' end."

A large number of cars have stencilled upon them information regarding the kind of brake beams used, size of journals, make of coupler equipment, and other items useful to car inspectors, repair men and others. Why not stencil a large A on one end and B on the other end, in conformity with the section quoted above? Such a practice would save much time, secure a greater degree of accuracy in making out cards, and facilitate business generally.

As it is now there are in existence some cars which have two brake staffs and no air brake equipment, and there are others with two staffs and two brake cylinders. Marking each end of such cars would effectively deal with this class of cases.

Some of the items now stencilled on cars, such as equipped with "Air Brake," "M. C. B. Coupler," etc., are in time destined to disappear, as unnecessary. The stenciling of the significant letters A and B on all cars, would not add expense, but would be useful and practical.

Lord Kelvin To-Day

The aged Lord Kelvin, who recently celebrated his seventy-seventh birthday, is probably the shyest and most modest man in proportion to his learning to be found in the United Kingdom. As you sit and watch the exquisitely gentle face, with the benevolent and winning smile illuminating it, it is almost impossible to believe that you are face to face with an intellectual Titan. He is simply a kindly, silver-haired man, with a face which is, as the French saying goes, "a benediction."

A well known public man who is a great admirer of Lord Kelvin was present one afternoon with many distinguished listeners to hear Lord Kelvin lecture at the Royal Institution on "Air." Lord Kelvin demonstrated that the air was "packed" in countless myriads of fourteen-sided parcels, so to speak, which he called "tetrakaidekahedrons." When Lord Kelvin finished, he said to his admirer: "I hope you have found my lecture interesting." "I am sure we should have, my dear Lord Kelvin, if we had understood it," was the reply. At which the latter laughed heartily. His subject was so simple to him that he had quite overlooked the fact that he had taken his audience clean out of their depth.

He is one of the few scientific men who have made science pay. His deep-sea lead is in almost universal use on ocean going steamships, and his compass has been adopted by the Admiralty and the leading mercantile lines. From these and his other inventions he has derived very considerable wealth.—*M. A. P., in the N. Y. Commercial Advertiser.*

An Effective Mosquito Guard

A railroad man who works in one of the switch towers on the line to Atlantic City, surrounded by a mosquito infested swamp, has a plan of his own for keeping them out of the tower. When the lamps are lighted and the insects swarm around the windows, the switchman makes a ball out of his morning newspaper and soaks it in coal oil just enough so that it will not drip. He hangs this midway between two windows and keeps it swinging all the time. He says that no matter how thick the mosquitoes may be outside they never care to pass it.—*Philadelphia Times.*

PERSONALITIES

L. R. Johnson has been appointed assistant superintendent of rolling stock of the Canadian Pacific.

D. W. Cunningham has been appointed master mechanic of the Rock Island & Peoria, with headquarters at Peoria, Ill., succeeding A. McCormick, resigned.

J. N. Barr has resigned as mechanical superintendent of the Baltimore & Ohio Railroad to accept a similar position with the Erie, succeeding A. E. Mitchell, resigned.

A. E. Mitchell has tendered his resignation as mechanical superintendent of the Erie Railroad. Mr. Mitchell entered the service of the Erie on November 1, 1886, with special duties in the motive power department. He was made engineer of signals on June 1, 1887, and from June 1, 1889, to January 1, 1890, was engineer of tests. He was for nearly two years mechanical engineer, and was appointed superintendent of motive power in April, 1892. His title was changed to mechanical superintendent on July 1 last.

W. T. Rupert, master mechanic of the Pere Marquette at Ionia, Mich., has resigned, the resignation taking effect on September 15.

A. McCormick, master mechanic of the Rock Island & Peoria, has been appointed master mechanic of the Southwestern Division east of the Missouri River of the Chicago, Rock Island & Pacific, in charge of locomotive and car departments, with headquarters at Trenton, Mo., to succeed John Gill, resigned.

C. A. DeHaven, formerly master mechanic of the Kansas City Southern at Shereveport, La., has been appointed superintendent of motive power of the Shreveport & Red River Valley, with headquarters at Shreveport, La., to succeed W. R. Howden, resigned to accept the position of division master mechanic of the Louisville & Nashville at Anniston, Ala.

J. G. Powers, who has been motive power inspector for the Pittsburg, Cincinnati & St. Louis Railway, at Columbus, O., has been appointed assistant foreman of the Logansport, Ind., shops.

Cecil Gabbett, superintendent of the Seaboard Air Line at Savannah, Ga., has resigned to go into the lumber business in that city. Mr. Gabbett has been in railroad work ever since he came to this country, in 1870, and has held a number of important positions in the South, viz.: General manager of the Western Alabama, the Atlanta & West Point, the Central of Georgia, and of the Georgia & Alabama until its consolidation with the Seaboard Air Line.

D. J. Durrell, mechanical engineer of the Pittsburg, Cincinnati, Chicago & St. Louis Railway, whose headquarters are at Columbus, O., has been appointed assistant engineer of motive power on the Southwest system of the Pennsylvania lines. As assistant to Superintendent of Motive Power T. W. Demarest, Mr. Durrell's headquarters will remain at Columbus.

W. C. De Armond has resigned the office of secretary of the Pressed Steel Car Company as well as that of secretary and treasurer of the Thornton N. Motley Company, in order to devote the whole of his time to the management of the Protectus Company, of which he is president. This step was made necessary by the rapidly increasing business of the Protectus Company.

A. A. Mayer has been appointed master mechanic of the Grand Trunk, succeeding J. E. Muhlfield, who has been made mechanical superintendent of the Intercolonial Railway, vice G. R. Joughins, resigned.

E. R. Russell, superintendent of the Quebec, Montmorency & Charlevoix, has been appointed general superintendent of the Great Northern of Canada.

F. D. Casanave has resigned as general superintendent of motive power of the Pennsylvania Railroad to succeed J. N. Barr as mechanical superintendent of the Baltimore & Ohio. Mr. Casanave has been connected with the Pennsylvania since 1862, when he entered the Altoona shops as an apprentice. He served about one year as inspector of locomotives, and was later made assistant master mechanic at Altoona in 1876. From 1881 to 1887 he was master mechanic at Fort Wayne, and from 1887 to 1893 superintendent of motive power of the northwest system of the Pennsylvania lines. In March, 1893, he was appointed general superintendent of motive power of the Pennsylvania Railroad lines east of Pittsburgh and Erie.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.

Official Organ of the Master Car and Locomotive Painters' Association

M. C. & L. P. A. CONVENTION

Official Report of Proceedings Thirty-second Annual Convention of the Master Car and Locomotive Painters' Association, held at Buffalo, N.Y., September 10-13, 1901

President Bruning called the convention to order at 9 A. M., and the proceedings were opened with prayer by the Rev. Frank B. Carlton, pastor of the Bethlehem Presbyterian Church, Buffalo, N. Y.

In the absence of Mayor Diehl, who was detained by an accident, Mr. F. P. Coppins, ex-president of the New York State Association of Master House Painters and Decorators, was called upon to address the convention.

Mr. Coppins.—Mr. President and gentlemen, I was never mistaken for the mayor before, nor called upon to fill his place to extend to a convention a cordial welcome to our beautiful city. Nevertheless, the duty is a pleasant one, and in his name, and on behalf of the Buffalo Master House Painters' and Decorators' Association, as well as on behalf of every citizen of our city, I give you cordial greetings and bid you godspeed in your deliberations. I hope that you may have a most profitable time while you are with us, not only in your deliberations as an association, but also it is my hope that your time may be most profitably and satisfactorily spent in participating in the various forms of entertainment, socially and otherwise, which have been provided, especially in your visits to our "Rainbow City"—the Pan-American Exposition, and it is my earnest hope that during your stay we may all witness the complete restoration to health of our beloved President who was so foully stricken down on Friday last by the hand of the assassin. Gentlemen, I again extend to you a cordial welcome to the Queen City of the Lakes. (Applause.)

President Bruning.—I am sure we appreciate your kindness, Mr. Coppins, and that we all join in the prayer for the recovery of the President. I will ask Mr. Samuel Brown to say a few words on behalf of the association.

Mr. Brown.—On behalf of the Master Car and Locomotive Painters' Association I thank you, Mr. Coppins, for your interest and for your attendance here; and I call to mind the very pleasant entertainment we received at the hands of the Painters' and Decorators' of New York several years ago, and also the pleasant personal acquaintance that I had with several of their members in Boston. We all know there is a strong bond of sympathy between the various branches and departments of painting, and that we are always pleased to have any of their representatives with us at our conventions, knowing that our consideration of matters for our mutual good will of course further our mutual interests. I urge you, strongly, brothers of the brush, to hang together as long as there is a bristle in the brush, thereby cementing the bonds of friendship and carrying out the grand work that the painting fraternities are engaged in.

There is a broad bond of sympathy at the present moment connecting every loyal American heart with that home in this city where a loving wife watches with tenderest solicitude for the restoration to health of our President who is so near and dear to every American citizen, and let us all hope that he may speedily recover from the effects of the assassin's bullet.

President Bruning then read his address as follows:

PRESIDENT'S ADDRESS

Ladies and Gentlemen: To say that it gives me great pleasure to welcome you here this morning, on this, our thirty-second annual meeting, is expressing it mildly; and, were it not for the dark shadow of gloom that the hand of the assassin has spread over our beloved country by his dastardly attack upon the life of our honored President, we could much more enjoy the reassembling of ourselves as a band of friends and brothers, whose object is our own advancement in qualifications to better serve the interests of our employers.

It is only seven years since we met in this hospitable city, but what wonderful changes have been made in that short space of time. Within a few moments ride from us, a new city has been built, commonly called the "Rainbow City." How appropriately it is named you will see when you visit the Exposition Grounds in the evening, noticing the superb blending of colors, all the handiwork of master painters. In this connection we should be proud of the master house and decorative painters. They are of the same craft, but following a different line. For this reason I have extended them a cordial invitation to attend any of our sessions when convenient to them. I trust you will give them a hearty welcome.

The past year has brought many changes. It is with sorrow that I announce the death of one of our faithful members, C. A. Bruyere, and two associate members, John Weymer and A. L. Keyes. It will here not be amiss to mention the death of one of our ex-members, Thomas Dunlap. At the proper time a committee will be appointed to draw up suitable resolutions to send to the families of these departed co-workers.

We have met here to-day to discuss the various subjects selected by your advisory committee. As I said in my open letter in the *Digest* they are all good subjects, and we can all derive great benefit from their discussion. I ask that each member be in attendance on each day's session, for we must not forget that it is through the kindness of our superior officers and an all-wise Providence that we are permitted to assemble here to-day. It is true of the old adage that "All work and no play makes Jack a dull boy;" but let us do the allotted work first each day, and after each session indulge our lighter moods.

In the past year I have endeavored to serve you faithfully. I have written several letters to foreman painters in the different sections of the country, urging them to join us. As yet, what fruit they have borne I cannot say. As your executive officer, I received a very cordial invitation during the past year to attend the Master Mechanics' convention at Saratoga. On account of press of business, I was prevented from attending. I wrote Mr. Morris, their president, thanking him in behalf of our association, and at the same time delegated Messrs. Gohen, Butts and Miller to represent our association. They had been previously appointed a committee to attend in regard to getting up a uniform system of freight car stenciling. I have no doubt this committee has performed its duty, and its report will be furnished to you later. It has been said of some associations, "Oh, they only go to have a good time." Not so with the Master Painters. It is true, we each and every one of us are fond of a good time, but not until business is disposed of.

Have you ever paused to consider what a vast amount of good this organization has done for foreman painters in railroad and private shops; I can say without fear of contradiction, that it has saved many a foreman his position and the corporation he serves hundreds of dollars. Let us then keep our good name and work unselfishly for the best interests of the roads we represent and our organization.

I can scarcely find words to thank the various committees for the assistance and co-operation given me. Especially would I mention our Secretary, Mr. Robert McKeon. And now, thanking you for your kind attention, I declare the convention open for business.

Mr. Copp.—Mr. President, I offer the following resolution: Resolved, That we extend our heartfelt sympathy to the President of the United States and his estimable wife in the dreadful calamity that has befallen him and sincerely pray for his speedy recovery. That we deplore the condition of society which

makes possible such a dastardly attempt to end his noble life, and recommend such national legislation as will effectually eradicate the cancer of anarchy from our body politic, together with the swiftest and most severe punishment for the despicable assassin.

(The resolution was duly seconded and adopted unanimously by a rising vote.)

President Bruning.—Gentlemen, we have with us now the Hon. Conrad Diehl, Mayor of the city of Buffalo, who has been unavoidably detained on account of an accident, and it is my pleasure to introduce him to you. (Applause.)

Mayor Diehl.—Mr. President, Ladies and Gentlemen, I sincerely regret the accident that prevented me from being here on time. I always like to keep my promised engagements, for I consider my word equal to my bond. It certainly gives me great pleasure to greet this splendid convention, and to welcome you one and all to our city. This is more especially true since you have done the right thing by bringing with you your wives and sweethearts. I hope and know that you will enjoy your stay in our midst. I am certain that your visit to our exposition will give you a peculiar pleasure, as there you will see the highest form of the art of painting in colors, and you will certainly enjoy as fellow artists the beautiful color scheme of Mr. Turner and his fellow craftsmen at the exposition. You will find ours a beautiful city indeed, with its miles of broad asphalt, its handsome residences, and its wonderful electrical privileges. I extend to you the freedom of the city and trust that you will accept the same in the fullest sense of the word. (Applause.)

President Bruning.—Mr. Gohen, will kindly say a few appropriate words in response to His Honor's cordial greeting?

Mr. Gohen.—Mr. Mayor, on behalf of the Master Car and Locomotive Painters' Association I thank you for your kindly welcome and cheering words. When our association, one year ago, at Detroit, by unanimous voice concluded to come to Buffalo during the Pan-American Exposition, there were many fond recollections of a previous visit to your beautiful city, and we recalled the pleasant time we then had. Sometime afterwards our advisory committee at Cincinnati, through some ill-advised report, feared that perhaps we had made a mistake, that we might not get the accommodations we desired, or that there might be too much pleasure and recreation at the expense of our deliberations as a body organized for mutual advancement in our work; and the committee concluded to change the place of meeting to New York City. When this became known the cry immediately arose from all parts of the country, as long and as deep and as loud as the Macedonian cry of old, but it was not a cry for war, not a cry for victory, not a cry for revenge, but it was a peaceful, pleading, plaintive cry—"Put me off at Buffalo." (Laughter.) They harkened to the cry, and now that we are here we hope to pass as pleasant and, if possible, an even more enjoyable time than we did before.

Ordinarily we have met at our annual meetings with cheerful faces and joyful hearts, but to-day there is a cloud hanging over us. Our beloved President has been stricken down by the hand of the assassin, and our hearts are beating in unison, every pulsation vibrating with pity, with sympathy, with love, with hope with each pulsation of the heart of that saintly woman who is watching and praying that he who was a comfort to her in her health and a tower of strength to her in her sickness, will be spared. The prayers of the nation are also asking that, and we have been told this morning that our President will live, and we trust that he may be again restored to health to be a still further comfort and help, for we look upon him as being the kindest, and truest, the best and noblest husband the American people have ever known as their President, and we are deeply grateful at this convention because we feel that we may be permitted to turn it into a thanksgiving meeting before we depart. Again thanking you for your kindly welcome and accepting it as you tendered it, we extend to you our best wishes, Mr. Mayor. (Applause.)

UNIFORM STENCILING OF RAILROAD CARS.

President Bruning.—If there is no objection we will hear at this time from Mr. Gohen, chairman of the committee on the uniform stenciling of railroad cars.

Mr. Gohen.—The committee on uniform stenciling—Mr. Miller, Mr. Butts and myself, attended the meeting of the Master Car Builders' Association at Saratoga, in conformity with the instructions of your advisory committee, and laid before that body blue-prints and suggestions for the uniform stenciling of freight cars. The communications and the blue-prints were referred to the executive committee of the Master Car Builders' Association, and they are to act upon them, and we shall hear from them later. I understand that Mr. Brazier, of the New York Central, will be present with us to-morrow as one of the executive committee, and he will then address the association upon this question.

COMMITTEE ON TESTS.

President Bruning.—Mr Rodabaugh, of the Committee on Tests, has a short report to make at this time.

Mr. Rodabaugh.—Mr. President, as one of your committee on tests I have made a few tests with red lead, notwithstanding Mr. M. T. Lindsay and Mr. A. P. Dane condemned the use of red lead. The time is too short from one convention to another to make any of these tests very satisfactorily. I took five pieces of tank steel, about 8 by 8 inches, and painted one in the natural condition; by that I mean that I took a piece from the sheet and painted it without cleaning or sandpapering it; one piece was cleansed with a wire brush, one with sandblast, one with 95 degrees heat, and the other with sulphuric acid. They were all painted immediately after they were cleaned. I put them on a board and hung them up on the southeast end of our paint shop, December 1, 1900. The lead was mixed with Thresher's boiled linseed oil. I examined the five pieces of steel September 5, 1901, and did not find much difference in the pieces; all were yet in fine condition, not a break in either of the pieces.

Mr. Quest then made the following report:

CAR CLEANERS.

From a material standpoint there were eight car cleaning compounds practically tested by a member of your committee. The test was for the purpose of ascertaining the nature of the cleaners, and their erosive properties. It was found that four of the compounds were alkali emulsions, two containing silex erosives, the remaining two, calcerous earth.

These four cleaners were found to be as near the safe neutral point as they possibly could be, so that several applications would not perceptibly harm a fairly good conditioned body of varnish. But it was found, in repeated tests, that these several materials were saponifications pure and simple, which, when applied to a partially perished varnished surface would greatly increase the already gray, chalky cellular appearance, showing conclusively that an alkali solution of the mildest type will not renew or build up, but will have the directly opposite effect of gradually destroying, especially when applied on the lustreless semi-dead varnished surface of a railway passenger car or locomotive.

There were two acid combinations tested, both of which were found to be good cleaners and which, at time of application, apparently had no bad effect upon the varnish in the cleaning process; but, owing to the presence of the acid, were found to be so hard upon the hands of carshop help as to force the discontinuance of their use. One of these acid cleaners in particular was found to be a speedy, excellent cleaner. There was, as superficially viewed, every evidence that such cleaning compounds made a much better and safer all-around varnish cleaning agent than those containing an alkali. The second acid cleaner, tested, was undoubtedly made up from one of the world's strongest acids, and it was found that where this particular compound was repeatedly used, it would not only remove the dirt, but would also gradually, but surely, destroy both paint and varnish by robbing them of their elasticity.

The two acid cleaners contained no erosives, their makers evidently having great faith as to their cleaning power without the admixture of any abrasive substances.

The seventh cleaner tested clearly suggested the presence of a natural percentage of an acid petroleum product heavily charged with silex. This material was found to be a very rapid cleaner, but decidedly unsafe to place in the hands of unskilled men on account of the great liability of their cutting through corners of battens, etc.

The eighth and last cleaner tested also suggested a peculiar natural product with a well-balanced calcerous erosive which, on repeated trials, on both interior and exterior work, proved to be fairly rapid cleaner, but perfectly harmless, in a material sense, when coming in contact with paint and varnish. The antiseptic claims made for this material were also manifested on the interior cleaning test by the pleasant odor left in the car after cleaning. An all-around varnished panel, after having

been submerged two weeks in this cleaner, failed to show the slightest effect on the varnish. This cleaner was also found to be a non-oxidizing material, which readily wipes up clean and dry, even thought the object cleaned be glass.

The paramount demand for safe car cleaning material has prompted your committeeman, after having made these several cleaner tests, to arrive at the conclusion that only this latter class and kind of car cleaning compound can be recommended as being absolutely safe to place in the hands of the unskilled labor usually employed at railway passenger car cleaning.

Mr. Fitch.—I have the missing samples that have received the salt-air and fresh-air exposures, and will later offer them to the convention.

On motion the report of the committee was received with thanks.

Mr. Rodabaugh.—I have a few notes on points not covered by the committee which I would ask permission to read:

"In consideration of the treatment of steel cars, there is a very important question I desire to present to this convention. It is this: What is the best protective coating for the sills and stringers where they come in contact with the box or hopper of the car, the seams and the metal behind the stakes; where the water, impregnated with sulphur and acids, causes the rapid destruction of the paint and the destruction of the metal body rapidly follows? I do not refer to the body of the car, as we can readily reach that portion and properly take care of it. It is the treatment of joints, seams and unexposed places upon which we seek information. It would seem to be an almost useless expenditure of time and money to paint the body of the car until we can discover some method of properly protecting the parts we have mentioned, in substantially the same manner as we do the joints and unexposed places in a wooden car. When we shall have devised some method of giving this protection it is quite certain that we can very largely lengthen the life of the car—possibly one-half. Mr. Lindsay, a master painter, in reply to a criticism by Mr. Matern, is quoted by Mr. A. P. Dane, of the Boston & Maine Railroad, in a paper read before the convention of the master painters held at Philadelphia in 1899, relative to the comparative values of protective coating for iron and steel work, such as bridges and cars, as follows: "The paint on the bridge that had been painted with Prince's mineral brown, or iron ore paint, as Mr. Matern pleases to call it, was found to be in fair condition after ten years of exposure." In view of this report we are moved to ask why this would not be a good paint for the unexposed parts of a steel car, such as we have mentioned. We believe those in charge of the work on the B. & O. Railroad have had a larger experience than any of us in this matter, and it would be both gratifying and instructive to listen to their experience if they will give us the opportunity. This subject is one of very great importance to the companies we severally represent, and they probably look to us for a settlement of the question. We would all, I think, gladly listen to any remark any one may offer on this subject."

Mr. Quest.—I would say, Mr. President, that when the cars are turned out, if properly inspected, they should be red lead coated before they are rivetted up, and if this was properly done, the corrosion should not take place. The manufacturers usually paint the cars inside, but this, we think, is useless. If Mr. Rodabaugh has met the trouble he complains of, it is evident that the inspector had not properly looked after the work, and the cars had not been properly painted under the rivetted parts.

ANNUAL DUES.

A resolution was offered to amend the constitution to make the annual dues $3 instead of $2.50.

Mr. Little.—Would it not be better to cover the deficiency by a special assessment instead of making this a permanent matter?

Mr. McKeon.—The expenses, Mr. President, of last year were unusually large, but I believe dues of $2.50 will be sufficient, provided the membership is fully paid.

On motion, duly made and seconded, a resolution was carried that a special assessment of 50 cents per member be made.

ELECTION OF OFFICERS.

President Bruning.—Election of officers being next in order, I will appoint as tellers Messrs. Gohen, Quest and Rodabaugh.

Mr. Gohen nominated Mr. A. P. Dane for President, and, on motion, the Secretary was duly authorized to cast the ballot of the association in favor of Mr. Dane, which he did, and Mr. Dane was declared duly elected President.

Mr. Dane.—I assure you, gentlemen, I appreciate the great honor you have conferred upon be in electing me your President for the ensuing year. I will not occupy your valuable time with any extended remarks, but I thank you for the honor, and I accept the trust with some trepidation. However, my sole aim will be to further advance the interests of the association, and to guard the privileges and benefits of its members. (Applause).

Mr. W. C. Fitch was duly nominated and elected First Vice-President.

Mr. Fitch.—Mr. President and Gentlemen: I thank you for the honor you have conferred upon me. I think perhaps you have extended to me this favor more on account of the distance I have traveled to come here than on account of my ability to serve you. I can only say that I will do my utmost to perform the duties of the office as well as I can, and I shall ever remember the kindness that you have shown towards me to-day.

Mr. Brown.—For Second Vice-President I nominate Mr. Charles A. Cook. I want the association to have everything cooked right, and I believe Mr. Cook will be the right kind of a Cook for this association to have.

Mr. Gohen.—Mr. President, my good friend, Mr. Sam Brown, says he wants to have things cooked right in this association. I have no objection to that, but we are going to burn him up, and I therefore nominate an unrepentant, unregenerate rebel, a man who is so low in the scale of humanity that hardly any of the members of this association would recognize him. I nominate that prince of good fellows, Tom Byrne, of Richmond, Va., and I promise you we will burn him up. (Laughter).

Mr. Little.—I nominate Mr. John W. Lanfersiek for the office of Second Vice-President.

The result of the ballots was as follows:

Cook, 33; Lanfersick, 29; Byrne, 15. A second ballot resulted in the unanimous election of Mr. Cook, who, being called upon, said:

"Mr. President and Gentlemen: My election to the office of Second Vice-President comes as a surprise; but I highly appreciate the honor you have conferred upon me, and I will do all in my power to further the interests of the association."

Mr. Robert McKeon was unanimously re-elected Secretary by a rising vote authorizing the Secretary pro tem. to cast the ballot of the association.

Upon motion the convention then adjourned until Wednesday morning, September 11, at 9 o'clock.

Second Day's Proceedings

WEDNESDAY, SEPTEMBER 11, 1901.

President Bruning.—The convention will please come to order. We will now take up Subject No. 1:

"Is there a method of successfully treating passenger cars (going through shops for re-varnishing) which are more or less cracked and which have recently been cleaned at terminals with emulsion or other cleaners containing mineral or non-drying oils?"

The first paper is by Mr. W. J. Russell. Is Mr. Russell in the room? If not, we will have the Secretary read his paper.

The Secretary then read Mr. Russell's paper as follows:

PAPER BY W. J. RUSSELL.

In reply to this question I would answer yes, for I have cleaned and varnished such cars with the same success as cars without cracks; not with the time-honored process of bar soap and pumice stone, but with a strong liquid soap that absorbs all of the oil left in the cracks; that not only absorbs the oil, but does away with many of the small and varnish cracks.

Bar soap will not do the work and the use of benzine and naphtha first is expensive, slow and not satisfactory. When cars are to be cut in, the soap can be used stronger, and it cuts the expense down to two or three dollars, with no bad results. Experienced hands are necessary, as men without experience are apt to do considerable damage.

President Bruning.—The next paper is by Mr. C. B. Harwood, of Huntington, W. Va.

PAPER BY C. B. HARWOOD.

In submitting a paper on Subject No. 1, I must say I am not able to give the Association such information as they de-

sire, or as I should like to give, for the reason that we do very little revarnishing on our system. The management of our road is so exacting as to the appearance of our equipment and the color is so delicate, that I find it impossible to clean and varnish many of our coaches and give satisfaction to my superiors; what little is done is confined to postal, baggage and second-class cars. Of an output of 75 coaches I have cleaned and varnished but 7; these cars were slightly cracked, but not badly so.

We do not attempt to clean and varnish badly cracked cars. Our people will not permit it; so we remove the varnish if varnish is cracked, and recolor or burn them off, if foundation coats are cracked, and repaint them; so you will readily see that I am in no position to give you very much information on the subject.

Owing to existing conditions, I find it a difficult matter to clean and varnish our cars after six months' service, and so far this year I have cleaned and varnished one car only. The reason for this is, as stated before, that our color is a very delicate one, and if run more than the time indicated, the dirt and smoke, especially the latter, penetrate the color so much that it seems impossible to clean them in a satisfactory manner, so we are often compelled to recolor coaches on which the paint is in excellent condition and the varnish is fair. If these cars were painted "Pullman," "Tuscan red" or any of the other dark colors, they would revarnish with what would be considered first-class results.

All our equipment is cleaned at terminals with emulsion cleaners, and I can say that it does not interfere with the cleaning and varnishing of cars when the varnish is alright.

As to the method of successfully treating cars for revarnishing after the use of emulsion cleaners containing non-drying oils, our practice is the old method of soap-and-water with pumice stone. After this operation we treat the cracks such as we tolerate on our road with benzine applied with a short bead scrub brush, using the benzine freely. We have had no trouble with our cars when so treated. In conclusion I will repeat that we do not attempt to clean and varnish cars that are badly cracked.

PAPER BY J. C. MARTIN.

Having been assigned the above subject, I will endeavor to demonstrate to you in my humble way how it can be done. As soon as a car is taken in for revarnishing, I look it over very carefully, and if I find that the car has been recently cleaned with an oil emulsion and the varnish is not cracked, I set the men to work with benzine and painters' scrub brushes to remove all traces of grease; then I follow up with Modoc powdered soap and scrub the car the same as I would any other car for revarnishing. I have, up to the present time, experienced no bad results, such as pitting and crawling of varnish on cars treated in this way. Cars that are slightly cracked I put through the same process with this addition: After the car has been benzined, I mix up a filler of the following preparation:

"Take corn starch for a base; mix it up to a stiff paste with one-half coach Japan and one-half linseed oil; then reduce this to a working consistency with turpentine."

Apply this all over the car, and when set, wipe off with waste. I then putty up all of the dents and scratches, and let the car stand still until the following day. I then sand out putty spots, and cut in the car with one coat of body color, and I must say that I have had no bad results such as mentioned in the subject. A car treated in this way will last about two years longer than if the cracks had been neglected. I do not wish to impress upon the minds of our members that I am in favor of an emulsion that contains mineral or non-drying oil, or that I think that a car which is badly cracked can be made as good as new. That can only be done by burning off. I only wish to demonstrate to you that a car can be successfully varnished that has been cleaned with a non-drying oil emulsion.

President Bruning.—This subject will now be opened for discussion. I think it is one of the most important subjects that we have, and we will be glad to hear from you.

Mr. Worral.—Mr. President, I have cleaned and varnished cars that have been cleaned with emulsion cleaners, and I have never found any trouble so far.

Mr. Lord.—I would like to ask Mr. Worral if he didn't find trouble on the ends of cars, or if there are any cracks?

Mr. Worral.—I have not as yet.

President Bruning.—Did you have any trouble, Mr. Worral, with the end of your steps?

Mr. Worral.—Well, only where they use kerosene. Where they use kerosene I do, but not with any emulsion.

President Bruning.—Of course they do not use any emulsion for steps, but the grease and stuff flying from the truck wheels and boxes have to be reckoned with.

Mr. Worral.—No trouble with that.

Mr. Brown.—I would like to ask Mr. Worral if he applies any material to offset the effects of it?

Mr. Worral.—Not at all, only just the fluid soap, and scrub with pumice stone, and rinse off with water.

Mr. Brown.—How long after an application of the emulsion, that is, the time intervening between the last application of emulsion cleaner and the varnishing?

Mr. Worral.—Well, I could not tell as to that; have no record of it.

Mr. Copp.—It is, I believe, understood that terminal cleaning has not been carried on, on the Boston & Maine, long enough to cause any deleterious effects—which you probably aim at in this subject. I do not know that a car on the Boston & Maine system has been cleaned more than once with a terminal cleaner. I think those roads which have practiced terminal cleaning with oil cleaners over and over again, and whose cars have been charged by absorption with this non-drying oil, have had more trouble.

Mr. Gehman.—I have had a little experience in varnishing cars that had been cleaned with oil; I had one car, and I didn't pay particular attention to it, but after the car was varnished or while they were varnishing, I noticed it crawled very badly, and we had to sand-paper the car down in order to receive the next coat satisfactorily. But when the next car came in that I noticed had been cleaned, after we cleaned the car in the shop with soap and pumice stone I had a man go all over the whole surface of the car with a little naphtha on waste, and we had splendid results. No oil or anything else showed from the cracks or the joints of the car; and, with very little expense, I cannot see that that could not be prevented with naphtha or gasoline.

Mr. Butts.—I want to say, Mr. President, that I have had over three years' experience with oil emulsion cleaners containing non-drying oil, and that every car of the equipment of the New York Central system that was shopped the last year has been cleaned anywhere from two to four times with a non-drying oil cleaner, an oil emulsion; and that when we first began shopping our cars, about two and a half years ago, on the first three or four cars that we varnished we had some trouble with crawling, especially with those that were cracked to some extent. To overcome that we experimented somewhat, and found the following process to be effectual in stopping the crawling: Dilute about one part of muriatic acid with twelve parts of water. We use that in place of the soap. We use no soap whatever for cleaning the outside of a car that has been cleaned with an oil cleaner. This readily removes all the oil on the car, and we are having no trouble whatever. When a car is properly cleaned in this manner there is no crawling whatever. I have watched the matter very closely, and I can distinguish no bad results whatever from the use of the acid. If it is thoroughly rinsed off, after the oil has been dissolved by the acid, we have no trouble.

Mr. Worral.—How do you apply this acid?

Mr. Butts.—With a brush. We take an ordinary round scrub brush, and saturate the car all over; let it remain there twenty minutes or so, and then rub it with a scrubbing brush, just the same as if you applied soap and rinsed it off. We can clean a car quicker and very much better than we can with soap. We have a piece price for this work, and once or twice when we happened to be out of acids our men, working by the piece, came to the office and wanted more money for cleaning with soap than they were getting for cleaning with the acids, saying that it took them longer. We pay three dollars for cleaning a car in that manner, cleaning it in thorough condition for painting.

Mr. Worral.—Paint or varnishing?

Mr. Butts.—Or varnishing, cutting in; most of our work is cutting in. We are not doing any of what you would strictly call revarnishing.

President Bruning.—Could you clean a car, Mr. Butts, satisfactorily with that for revarnishing in case the body color was all right?

Mr. Butts.—Yes, sir.

Mr. Worral.—You clean a car fit for revarnishing for three dollars?

Mr. Butts.—That is our piece price. We never pay any more. We cleaned about seventeen hundred cars last year, from October 1 to June 1, at that price.

Mr. Lord.—Are the sash removed?

Mr. Butts.—Yes, sir.

Mr. Fitch.—You could not clean a car for that price with soap and pumice stone, the old way, could you?

Mr. Butts.—We used to pay $3.50 with soap and pumice stone. And I want to say that our cleaners are making better wages than our painters.

Mr. Gohen.—We have had considerable experience in the use of an emulsion cleaner, and I might say that I was a pioneer in emulsion cleaners. We have been using emulsion cleaner, to the best of my recollection, for about ten years now—all of that if not more; and I want to say that I do not think there is any one connected with our company who would go back to the soap-and-water cleaning after knowing the results we have obtained from the emulsion cleaner. I do not see why anybody wants to advocate a soap-and-water cleaner. And, so far as the varnishing is concerned, we have never had any trouble with varnishing cars that have been partially, or not very badly, cracked. A couple of years ago Mr. Becker and Mr. Block were over to Brightwood on a little test question; and, in making it, I noticed some of the siding had been removed from the car, and it was so badly cracked that we would not undertake to revarnish that car, because our color is very light (cadmium yellow). If you have a comparatively badly cracked car, you could not clean it up in a satisfactory manner for revarnishing; it would show badly in the revarnishing, but we have no trouble in varnishing our cars after 12 or 13 months' service, using emulsion cleaner right along; we have used nothing else. And I said to Mr. Block, "Now, Henry, there's a chance to see whether we can varnish a cracked car or not." So I brought the piece over to his office, and we went right out to a little shed adjoining, where they had the emulsion cleaner, and we cleaned it with the emulsion cleaner. I did it myself, in fact. Immediately after cleaning it with emulsion cleaner, I cleaned it off with soap and water, powdered soap and water with a little pumice stone added, such as we clean our cars with, and we went across the track where they had a little varnish room, got some finishing varnish, and I varnished that panel myself. Upon the first varnishing, or the first coat of varnish, we could notice just the slightest creeping or crawling in the immediate neighborhood of the cracks, such as you would get almost, you might say, even if you had used nothing but soap and water. I never saw a real badly cracked car that you could varnish, whether you used emulsion or soap and water, without some crawling. We let that stand for forty-eight hours, and I went there myself and took a piece of No. 0 sandpaper, and went right over that, just merely cut the surface of it, and gave it the second coat of varnish, and I want to show that to the members of the association. I want to show you that a car which we call badly cracked can be varnished successfully after having been treated with an emulsion cleaner.

Mr. Butts.—I think I ought to have said, Mr. President, that we also use pumice stone in connection with our acid. I want to say that lest my remarks might mislead some one. We use pumice stone just the same as when we use soap.

Mr. Gohen.—I want to say, further, that we varnished two pieces. We had two pieces of the sliding, and I tried one of them with just the soap and water alone, but a little pumice stone added; the other one I cleaned in the same way, and then used some gasoline, took a scrub brush, and went crossways of the board, which would, of course, be in the same direction as the cracks, and removed what oil may have remained in those cracks with the gasoline; but I didn't see any difference whatever in the looks of both those panels, either in the one cleaned with the gasoline or the one that was cleaned without gasoline. It did not make any perceptible difference.

Mr. Hartman.—What would be the approximate cost of cleaning a car as you have described it?

Mr. Gohen.—For revarnishing, or with the emulsion?

Mr. Hartman.—For revarnishing.

Mr. Gohen.—Well, I don't know. I am not in close touch with the figures. We are not working piece work.

Mr. Hartman.—We all admit the thing is possible, but would it be practicable and economical?

Mr. Gohen.—To use emulsion cleaner?

Mr. Hartman.—No; to clean the car in the manner you have described. The question is, is it practical to clean and varnish a car?

Mr. Gohen.—No; I understand the question to be—can a car that is cracked be treated successfully for revarnishing?

Mr. Hartman.—Yes; we all admit that it can be treated successfully, but would it be economy to do it?

Mr. Gohen.—Well, I do not think that has any bearing on the question whatever. That is something which I presume our companies decide for themselves. There are some companies that do not believe in revarnishing a badly cracked car. Our company is one of that class. Now, there are others that believe you ought to revarnish them; it doesn't make any difference if the cracks are as big as the cracks in an alligator's hide.

Mr. Hartman.—You will find that in a great many cases.

Mr. Gohen.—Yes. That is not the question at issue. The question is, can you successfully treat a car for revarnishing that has had an emulsion cleaner used on it? I think you can. And in my estimation, whenever a car is so badly cracked that you cannot revarnish it, the only way to treat that car is with the torch—the gasoline burner. And I think I can show you that these panels or pieces of sheathing which I have are certainly sufficiently cracked to justify us in not revarnishing that car.

Mr. Laufersiek.—Mr. President, I want to say that the cars on the Pennsylvania lines west of Pittsburgh are cleaned with emulsion cleaners, from two to ten times per year—they have been done that way for the past five years; and while in some isolated cases we might have some trouble, as a rule we have no trouble whatever in revarnishing the cars that have been cleaned by emulsion cleaner.

President Bruning.—Any other gentleman wish to have anything to say on this subject? This is a very important matter, gentlemen. Don't be afraid to get up. I would like to hear from some of the young members.

Mr. Miller.—I hold that a badly cracked car that has been treated with some of these emulsion cleaners cannot be successfully revarnished. I have never been able to discover a method of cleaning the oil, the non-drying oil, out of the deep cracks. I have tried everything, and the only way I could do it would be to use shellac, and we all know what that is; none of us would advise using it. I have tried gasoline. I have had as many as four or five cars in the shop at one time, that were cracked, some of them very badly—one car especially, a good vestibule car. It happened to come in when the car could not be spared off the road sufficiently long to burn it off; we were told to fix it up the best we could. The cracks were deep; they went right through to the wood, but they were not very open. That car just simply went all to pieces. When we got a coat of varnish on it, it looked so badly that we simply couldn't let it go. We had to burn that car off. And this, too, after we had used all precautions that we knew of to remove the trouble. We knew the seat of the trouble. We knew that we were going to have trouble. We tried washing it with a soap and scrub brush, with pumice stone, and rewashing, also washing with gasoline, benzine, even tried alcohol on it, and immediately before varnishing we used gasoline. The car had been cleaned perhaps two or three weeks previous to coming into the shop, with one of these emulsion cleaners. It happened though to be about the worst one of those cleaners I know of.

President Bruning.—You are at perfect liberty; you can mention the names if you wish.

Mr. Miller.—I have given the matter extensive thought, and it has given me a great deal of trouble. I have tried perhaps a dozen emulsion cleaners, and while I find that some of them are not very dangerous, I find that all are dangerous if the conditions are right for danger; all that it requires are the cracks; let it get in there, and within two or three weeks or a month run that car in the shop, and you are going to have trouble. But there is absolutely no danger in using it if the car is not cracked. Sometimes small, fine cracks, where the oil does not

penetrate very deeply, give no trouble at all. I am at my wits ends to find a method for treating these cars so that there is no danger of the varnish crawling. I wish somebody would help me out.

President Bruning.—Anybody else wish to speak on this subject?

Mr. Copp.—I think there should be time enough elapse between the time the car is cleaned in the yard and its being revarnished in order to have that oil cleaner evaporate. If you do not, you will have trouble. I do not think cars should be cleaned in yards, anywhere near the time of their being shopped for varnishing. I know of a case in point. We had a car in our Salem shop, on the Boston & Maine system, which they cleaned up with an emulsion cleaner, and which was badly cracked; the oil spread from the cracks out into the painted surface of the car and made a bad looking job of it, so they concluded to clean the car and varnish it before they left the job, and they simply got into the mire a good deal deeper. If they had let the car go with simply wiping it off (what we call a dry wiping), there would have been no trouble, but they undertook to clean the car and varnish it, and the consequence was the varnish crawled away from the cracks, and made a very bad looking job. So I say cars should not be cleaned near the time of being shopped for varnishing, if you want to avoid these troubles. If they are cleaned a month or two, or three months before being shopped for varnish, with an emulsion cleaner, that that emulsion is allowed to evaporate thoroughly and the cars are then cleaned by some good and acceptable method before varnishing, I do not think you will have any trouble.

Mr. B. E. Miller.—Mr. Copp speaks of the oil evaporating. I think that process is very slow. In fact, these mineral or non-oxidizing oils, will not evaporate in the course of a month or two; they have simply got to ooze out—be drawn out by the sun, but they won't evaporate. A mineral oil will remain in those cracks for a year; it simply won't evaporate; it has got to wear off or be drawn out by the sun or left to permeate into the wood, and then the danger still exists. If you put varnish in there it will come right to the surface and attack the varnish and make it crawl. It has been my experience that it won't evaporate at all.

President Bruning.—Just one moment, before we go any further. I understand that we have a master car builder in the house here, from the Sunny South, and I would be glad to hear from Mr. Robadere.

Mr. Rodabaugh.—I am afraid that I wouldn't be able to say anything on that subject that is interesting, Mr. President. We do not use emulsion cleaners at all. We stopped that. We found them all to be worthless. We take our cars in now and just wash them with soft soap and cut them in and revarnish them about every eight months. We find it gives better results than the emulsion cleaner.

Mr. Paulis.—We have had a great deal of trouble on the road I am attached to with these emulsion cleaners. As Mr. Miller states, the width of the cracks is not important; it does not require a very large crack, but when it is once there you cannot do anything with it. The best results I could get out of it would be by cleaning it, and then putting some grain alcohol into the varnish at the time we are varnishing; say about one-quarter of a pint of grain alcohol to a gallon of varnish; nine times out of ten you would save your car by doing that.

President Bruning.—Do you not think if you run that car out in the hot sun and let that dry it out and wipe it off with waste that you would overcome that?

Mr. Paulis.—I don't know. We didn't try that. We did every other thing possible to eliminate that result, but couldn't get it out at all.

Mr. Butts.—Mr. Mliler says he has tried everything that he knows of to prevent this trouble. I want to ask him if he has tried the muriatic acid treatment that I spoke of? While I am on my feet, I want to say that an emulsion cleaner that is mixed with an acid cannot be successfully cleaned with soap and water. I have proved that fact to my satisfaction. Soap and acid do not work well together. An acid cleaner cannot be cleaned with soap and water. It can very readily be cleaned with acid. That is why we are using acid. We are having no trouble at all.

Mr. Gohen.—I would like to ask Mr. Butts if he thinks that an acid cleaner in the shop would clean off a car that had been cleaned with an oil emulsion cleaner?

Mr. Butts.—Yes, sir.

Mr. Gohen.—The acid will clean the oil emulsion, but the soap and water will not clean an acid emulsion?

Mr. Butts.—Yes, sir.

President Bruning.—Does any other gentleman wish to have anything to say on this subject?

Mr. Brown.—I would like to ask Mr. Paulis if he really meant that he mixed alcohol with varnish?

Mr. Paulis.—I certainly did, and got good results from it.

Mr. Brown.—Well, I have certainly learned something this morning.

Mr. Miller.—You will have no trouble mixing the alcohol with the varnish, although I would not advise you to do it for the sake of the varnish unless it is absolutely necessary to overcome some difficulty of this kind. Mixing alcohol with varnish is an old trick of a painter to deaden varnish to match old varnish that has lost its lustre. I wouldn't advise doing it. It doesn't do the varnish any good.

Mr. Gohen.—It doesn't hurt the alcohol.

Mr. Brown.—I don't want to put any alcohol in. The alcohol will injure the varnish.

President Bruning.—Gentlemen, this is getting foreign to the subject, and I will have to call you to order. Let us confine ourselves strictly to this subject. I do not want to be abrupt, and I do not want to hurt anybody's feelings, but we will get something in print probably that we don't like after a while. Now, Mr. Gohen?

Mr. Gohen.—Mr. President, as I said a few moments ago, the proof of the pudding is chewing the string of the bag. Here is the string right here (referring to panels). It is for the inspection of any of the members of the association. Mr. Miller says a car that is cracked cannot be varnished after using emulsion cleaner on it?

Mr. Miller.—How many coats of varnish have you on?

Mr. Gohen.—Two coats.

Mr. Miller.—The first rather crawled?

Mr. Gohen.—A very slight crawl, yes.

Mr. Miller.—You succeeded in making the second hold?

Mr. Gohen.—Yes.

Mr. Miller.—The effects of the first crawling are apparent to my eye, though.

Mr. Gohen.—You could take a car which had not been treated with emulsion cleaner, with the same amount of cracks that show here, and you would not get a bit better job. There isn't any crawling there. Now I want to show you, gentlemen, here is the other part of it; there is the condition of that car. Would you object, Mr. Miller, to turning out a car in that condition?

Mr. Miller.—I certainly would, if I was compelled to turn that car out without burning it off.

Mr. Gohen.—Oh, I know, but I mean so far as successfully varnishing is concerned; would that be good enough varnishing?

Mr. Miller.—No, I would want to recolor it.

Mr. Gohen.—I sawed those panels off in that manner so as to get them in my trunk. I said to you a few minutes ago, gentlemen, that this was removed from a combination car (indicating), which was damaged on the road. Now, we wouldn't undertake to clean and varnish a car that was as badly cracked as this, and my friend Mr. Miller says he wouldn't either. But I want to say that that is a fairly good job of varnishing on a cracked car on which the emulsion cleaner was used, not more than ten minutes before this was varnished, and this car had been cleaned I don't know how many times, possibly once a month. It was out some 18 months since it was in the shop before, and it had been cleaned possibly once every two months, and I know it was oftener than that, because it was in one of our preferred runs. Now, I cleaned that, Mr. Miller, as I say, not to exceed ten minutes before it was varnished. Mr. Block sits there, and Mr. Becker over there, both of them were present and saw the thing done. Now, I say that that is a fairly good job of varnishing for what you might call a badly cracked car, and nobody need be ashamed of it; if they had a dark color they need not be ashamed of the varnish that was done on that car, if it was a dark-colored car, but we would not revarnish

that car because it is in too bad a condition to revarnish for our light color.

Mr. Miller.—My friend Gohen misquotes me, entirely unintentionally, of course. He says that I would not revarnish a car of that kind.

Mr. Gohen.—I think I understand you so to say.

Mr. Miller.—I wouldn't revarnish a car of that kind without thoroughly rubbing it down and recoloring it; nine-tenths of the painters in this room are compelled to revarnish such cars or recolor them right along; they cannot spare cars of that kind to burn them off when they get into the shop; they are too good. Take a car of that kind and rub it down and recolor it—you turn out a very good, respectable looking job; a very nice job; the cracks do not show at all. Of course, they reappear when they get it into the sun and rain a while, but that is not a very badly cracked car. The time to burn off, for most of us, is when the paint begins to shell and we cannot do anything more with it, and won't recolor or cut in. That is not a very badly cracked car, Mr. Gohen.

Mr. Gohen.—Well, if I misquoted Mr. Miller, of course I am sorry. I do not mean to intentionally misquote any one.

Mr. Miller.—Surely not.

Mr. Gohen.—But I will then take Mr. Miller's statement for it. Your cars are dark, are they not, Mr. Miller?

Mr. Miller.—Our cars are dark.

Mr. Gohen.—Now, he says he would not attempt to revarnish a car that was cracked like that is: he would recolor it. Now, gentlemen, there is a virtual confession that you can successfully revarnish a car or you can treat a car successfully for revarnishing that has been treated to an emulsion cleaner. Mr. Miller says there is a job that is so badly cracked he wouldn't undertake to revarnish it, but he would recolor it. Now, I leave it to the sense of this meeting here whether that is not a fairly passable job of revarnishing on a pretty badly cracked car? That is the question before us—whether you can revarnish a car that is cracked? Mr. Miller says he would not undertake to revarnish that car, but he would recolor it. I have demonstrated that you can revarnish it. Now, that is the whole question in a nutshell, gentlemen. I am able to admit that we would not undertake to revarnish that car; we would recolor it or burn it off; in our case we burn them off: our company does not want cars so badly cracked to be recolored. It may be possible that those cracks are not further than through the varnish. That car had been varnished a couple of times, and it is just possible that they don't go any further than the varnish.

Mr. Miller.—I don't think they do.

Mr. Gohen.—Then we remove that varnish and recolor the car. That is what we are going to do in this case.

Mr. Miller.—And yet after saying that the cracks are not deep, that in your estimation they do not penetrate any further than through the varnish, you admit having had trouble with the first coat of varnishing, Mr. Gohen?

Mr. Gohen.—Certainly.

Mr. Miller.—The evidences of it are right there on the board. What would you do if you had a worse cracked car than that?

Mr. Gohen.—You say that we would recolor it.

Mr. Miller.—Well, that wouldn't stop it.

Mr. Gohen.—That has got nothing to do with this question here, Mr. Miller.

Mr. Ginther.—I would like to ask Mr. Gohen if the car that he is showing a sample of had any large bruised place that required much puttying, spotting out and puttying, and how those parts turned out?

Mr. Gohen.—I am glad to answer that question, Mr. Ginther. I cannot say as to that individual car. My recollection of that car is that it is one of our combination cars, however: but we very rarely get a car in for cleaning and varnishing that we do not have to do more or less puttying on it. There is one of our men, Charlie Becker, sitting over there, and there is another, Henry Block; I will let them answer that question. Personally I do not have anything to do with this work, but they do, and they can answer it. But I can say to you that we have no trouble in that line.

Mr. Ginther.—I had a little experience in that line, Mr. President. I had to deal with several parlor cars that had been treated with an emulsion. I cut the cars in after cleaning them, varnished them two coats, and I flattered myself that I was getting along splendidly with a car that had been treated with the emulsion cleaner. I was a little afraid of it, having had some trouble heretofore. After about three days of rejoicing the spots that were touched up and puttied, and which had been given special attention, began to sweat out. Finally the varnish got in such condition that the oil predominated instead of the varnish, and it made a bad spot that I had to clean with shellac, after varnishing the car, and touched up afterward with a little varnish, showing that although I had overcome the larger surface of the car all right, that where the wood was bruised a great deal, and the oil that was in the emulsion cleaner had penetrated deeply into the wood, the heat of the sun had sweat that oil out to the surface, going through the spotting-out color, through the puttying and through the varnish and destroyed the varnish only in those spots where the wood was badly bruised. But it goes to show that if the car is cracked sufficiently so that the cracks go into the wood, the oil in this emulsion will undoubtedly come to the surface. I have had good and bad results, and this is one of my experiences where the wood was very bad, making it porous, and it absorbed the oil in the emulsion. The rest of the cars I referred to are in splendid condition.

Mr. Waggoner.—We have a good deal of trouble with revarnishing cars after the emulsion is put on, but we do not do it very soon. We have not got the cars to spare to run them in soon after they are cleaned off with emulsion. Our cars are Tuscan color, and our stuff adheres closely to the Tuscan, and generally we have to scour so hard to get that off that it cuts it through, and we are almost compelled to cut the car in. This car that Mr. Gohen has done seems to be cracked only a little on the varnish. We have cracked cars that we have varnished, but we generally cut those in when they are badly cracked. We could successfully do it, if it wasn't for the emulsion in these beads, but that is done by inexperienced men. I believe if we did that or looked after the work ourselves, it would be more successful. This seems to be cracked only in the varnish. I notice down in the body——

Mr. Gohen.—I would judge it had only been cracked through the varnish. I didn't think it was a paint crack.

Mr. Waggoner.—Yes, just light cracks.

President Bruning.—Now, we want Mr. Becker or Mr. Henry Block, either one, to answer that question that was asked. Mr. Gohen wants them to answer the question because they did the work. Let's hear from Mr. Block. What was that question, Mr. Gohen?

Mr. Gohen.—The question was, do we have any trouble where there are scars, marked places on the car, spots, putty spots; do we have any trouble afterwards.

Mr. Block.—I had no trouble with those.

Mr. Beyer.—I have been using emulsion cleaner for about five years; we have cars coming in to be revarnished and the spots puttied up, and I have never had any bad results from it, not even crawling.

President Bruning.—Now, Mr. Becker?

Mr. Becker.—We have not had any trouble; we never had any trouble in regard to these bruised places on cars; that is, after they are thoroughly cleaned and we touch them up and putty them, we do not have any bad results.

Mr. Gohen.—I want to say that while I did not feel disposed to answer Mr. Ginther till I had the endorsement of Mr. Becker and Mr. Block, now I will ask them if we have not had cars where there was a rake almost the full length of the car and almost bad enough to take the siding out of it; I want to ask if you have not had cars where you have puttied up a long rake the full length of that car, and had no bad results; is it not a fact, Mr. Block?

Mr. Block.—No bad results of any kind.

Mr. Becker.—Yes, sir, I have had a combination car and a coach in that condition.

Mr. Gohen.—That is it.

Mr. Miller.—Had the car been cleaned with emulsion cleaner?

Mr. Gohen.—I want to introduce to you Mr. Eicher, our foreman in charge at Cincinnati. He has charge of the Cincinnati inspectors and cleaners. I wish you would tell these people about how often you modoc cars in the Wood street yards, on the average, Mr. Eicher?

Mr. Eicher.—About once a month, sometimes twice and some-

times three times; and our private cars never go out without modoc every trip.

President Bruning.—Gentlemen, I wish to go on record on this thing. It is a little out of order probably, but I want it distinctly understood that I have used emulsion oil cleaner for a number of years, and I have never yet failed to have good results in revarnishing the cars.

Mr. Brown.—I would like to ask Mr. Gohen, for the benefit of the gentlemen present, his preparation for following up these long rakes the full length of cars—the bruised places?

Mr. Gohen.—Well, as I said before, I do not do this personally, Mr. Brown, but I think I can give you the operation that Mr. Block, Mr. Becker and the rest of them follow. Of course, we clean the car off, which should be done in the first place, and then, if the car is to be revarnished, we just touch up the bruised or marred place with lead. We give it possibly two or three coats of lead, and then we putty right on that; then we cut it down, touch it up and varnish it. That is a simple operation that you would all do. There is no secret in it at all, none whatever. That is what you would do if you had that kind of a car.

Mr. Brown.—Mr. Ginther said he had had trouble with the oil sweating through that, and I thought possibly you might have some patent preparation for filling up those places to prevent the oil coming out.

Mr. Gohen.—None whatever. We use the ordinary method.

Mr. Ginther.—I do not want to go on record as having that trouble all the time. This case I referred to was an actual fact during very hot weather, simply showing what action the oil would have in cases of that kind. It does not always have it. It is not all over the car.

Mr. Houser.—I would like to say, Mr. President, that I have used the emulsion cleaner for, I think, four or five years, and I have not experienced any trouble at all in revarnishing or even when the car was marred.

Mr. Worral.—Had that car been treated with Modoc or emulsion cleaner after that scratch was put there, before you puttied it up?

Mr. Gohen.—The chances are, Mr. Worral, that it was because we are not always able to get a car in immediately after it is damaged. I want to say, though, that we do get them in very soon after, because whenever we have a car damaged on the road, a report, of course, comes to the Superintendent of Motive Power, and he turns that over to me, and I examine the car, and if in my judgment the car should come to the shop immediately, it comes immediately, but we sometimes have to run them in that damaged condition probably a month or six weeks; and, to emphasize that fact, we had a car that was damaged on the Lake Shore about a month ago. I was trying to get that car in for two months before I succeeded. Our baggage cars were in great demand on the road, and we had had a damage report card from the Lake Shore people, and of course we did not propose to charge those people unless we rectified the damage. I was very anxious to get that car into the shop, but, as I say, it was possibly two months after the car was damaged before it came into the shop, and the probabilities are that that car was cleaned with modoc either at Cincinnati or Cleveland in the meantime, because it was running in a regular train.

Mr. Worral.—Then the wood got charged with the oil?

Mr. Gohen.—In all probability, in that individual case, the wood was charged with oil. I would not say that as a positive fact, because I didn't know it, but the probabilities are, and I know in some other cases, they have been so treated.

President Bruning.—Anything else to be said on this subject?

Mr. Copp.—Mr. President, I suggest that Subject No. 2 be now taken up, because it is so near to the subject under discussion.

President Bruning.—Before we do that, I notice Mr. F. W. Brazier, Assistant Superintendent of Rolling Stock of the New York Central Railroad is with us, and I would be pleased to to have him come forward and give us a few remarks.

Mr. Brazier.—Mr. President and members of the Master Car and Locomotive Painters' Association, I have been delegated by the Executive Board of the Master Car Builders' Association to come before you to-day in response to a petition which you sent to our association through a committee, I think consisting of Messrs. Gohen, Butts and Miller. In the first place, I want to say one thing to you—I hope that you painters while you are in Buffalo will take nineteen parts of water to one part of alcohol. I am sorry to see my good Master Painter has got mixed up here taking nineteen parts of alcohol to one part of water. (Laughter.)

Mr. Butts.—I would like to correct my worthy superior by saying I did not mention alcohol.

Mr. Brazier.—The Secretary, no doubt, has a copy of the following letter.

(*Reads letter on proper method for uniform stenciling of freight cars.*)

I attended our meeting in Chicago last week, and we thought it would be best to refer this back to you for you to have a committee appointed and submit to us what you considered standard lettering, in sizes and style, thinking that we would let you do the work rather than ourselves.

I almost feel like the man who used to attend the Methodist and Episcopal and two or three other churches; somebody asked him which church he belonged to. Says he, "I belong to them all." So I find I am mixed up now with the Master Car Builders, the Master Mechanics and the Painters' Association, so I belong to all of the associations that are bound to lift up, educate and make us better railroad men. (Applause). I am very glad to know that there are attending this convention four of our men. The men on our system are given the freest latitude to express their views, and I hope none of them will leave the convention without expressing his views on this subject. If anything ails my watch I go to a jeweler; when anything ails our cars I go to Mr. Butts, Mr. Allen and Mr. Fox, who forget more in five minutes about painting and oil emulsions than I ever knew. I want to say to you that we have used oil emulsion on the New York Central for the past two and a half years, and I want to tell you we are having good results. It would be foolish to stand up before you and tell you something that is not true; yet I believe there may be something better than what we are using. But if our equipment is not right, Mr. Butts and Mr. Allen hear of it, for they are our doctors; we put the cars in the paint shop for them to give us results, and they would be very foolish men if they thought an oil emulsion was not the right thing; they would lose their positions very quickly. We give the painters full authority, and we feel that they know their business. I am a little surprised while sitting in this hall to hear a good many people talking while Mr. Gohen and others are addressing the meeting; they say nothing themselves; but outside of the hall they say, "That fellow is interested in this or that." Why don't they get up and give us their opinions in here? If you have something better than oil emulsion, Mr. Gohen wants to know it; I want to know it; Mr. Butts wants to know it. That is what you are here for.

I trust that regarding the matter of the Master Car Builders' Association, which you referred to us, that you now understand we have referred it back to you for you to take action and submit to us blue-prints, which can be done at our next convention, to be held in June, 1902.

I want to say one word more: I understand resolutions were offered here yesterday in behalf of the Chief Magistrate. I cannot speak in public at a time like this—knowing the prosperous times which the railroads have had the last few years, and knowing what a friend of the laboring man and a man whose teachings have brought about more for the good times we are having than any other man I know of, that is, President McKinley—without some feeling and all of us are united in the prayer which everybody is offering that his life may be spared. (Applause.) Of course, the railroad men of the country did more to elect him than any other class and I know we feel proud of him as an American citizen.

I want to say now just a few words to the Painters' Association, because you honored me in St. Paul by making me an honorary member. I have attended four of your conventions; I attend because I love to; I learn something; and I want our men to feel and think that they have the utmost freedom to attend these meetings. Mr. Waitt, our superintendent, is of the broad-gauge plan, always out for information, and we want our men to get it, and I hope the young men will feel that this is a grand chance for them. The railroad clubs, the Master Car Builders' Association, the Master Mechanics', Master Paint-

ers' and the Master Blacksmiths' Associations have done more to spread knowledge, to make us better acquainted, and to give us broader ideas than all the papers that can be read. We get together and exchange views and I, for one, am glad to see so many of you here. I hope that you will have an enjoyable meeting. One of profit, and don't think because Bro. Cohen gets up so often and talks, that he knows it all; some of you know other things; and you are just as free to express your opinions as he is; and don't, after the meeting, do like the politicians do—say that they have got a rotten party in power, get up and express your opinions. Mr. President, I thank you, and I know the Master Car Builders' Association extends to you a welcome hand and a godspeed in your work. (Applause.)

Mr. Brown.—Mr. President and gentlemen, I certainly wish I could speak with the enthusiasm that our friend Mr. Brazier has, but I know just the few short words that I may say will express our appreciation of his personal kindness and that of the road he represents and indeed of all the railroads. I wish every master painter had the full authority and the cheerful kindness which sends them to our conventions that his painters do. I know many of our members are restrained in that respect. It may be safe to say that some of them, I do not like to say it, but it is possible, that they do not make themselves quite worthy of that confidence; it is human nature, in part; but encouragement is what we all need; every man in his walk of life, needs encouragement, and I sincerely hope we will all endeavor to make ourselves worthy of that encouragement. I voice the sentiments of this association, when I say that our heartfelt thanks will go out to Mr. Brazier and his associates. We shall never forget him and will always remember his kindness in being with us and the kindly feelings that he brings to us in the greetings of the associations with which he is connected. Mr. President, I would suggest that a rising vote of thanks to be extended to Mr. Brazier and his associates for his presence here this morning. (Applause.)

Mr. Gohen.—I second the motion.

The motion was put and unanimously carried.

Mr. Gohen.—Mr. President and Gentlemen, Mr. Brazier in his remarks struck a chord that has been vibrating somewhat in my little two-by-four heart for a year, and I say this with no malice, vindicativeness, or anything of that kind, but he certainly did express a whole lot when he said that some of the members sit back there in their seats and say nothing; but, when I or others get up to make some remarks, they go out and say, "Well, they're running the whole shooting match," just exactly as was said to our friend Mr. Copp at our last meeting in Detroit. Someone—I don't think he knew what he was saying or realized the import of his words—said that it seemed as though a few were running this convention and that a young man had no voice whatever in it. Now I want to say to that party if he is in the house—I do not know him and of course there could not be anything personal in this, but I want to say to him that I am standing here as an example of what this association will do for its young members. I joined this association in 1890, in Boston, and I had never attended a convention before, but at the next convention, in Washington, as one of the newest members of your association, I was elected your president, and I certainly did appreciate that honor. Following me immediately was one of these old fellows who is always up on the floor talking and taking the initiative; his name was William O. Quest; he lives up in that "strike" town, Pittsburg. It was said of him that he, too, was another man that was always monopolizing the floor, and Mr. Quest was comparatively a new member when he was elected first vice-president during my term; and the next year we had a new member come from the south, Mr. W. T. Leopold. Upon his first coming to our convention that man was elected second vice-president of our association. And I challenge anybody in this room to say that there has been any time in the past ten years where any young man had been debarred from expressing his opinion. On the contrary the young men have been pleaded with, time and again, and in vain, to come forward and express their opinion. My good old friend here, Mr. McKeon can tell you better than I how hard it was before the advisory committee was appointed, for him to get members, either old or young, to take hold of these subjects and to bring them forward for discussion; he has had, time and time again, to beg and plead with the members and they would not do it, and these very ones who refused were the ones who sat back and said, "Why, that man is running it" or "this man is running it." I know I talk too much, but somebody has got to do the talking, and if it is not Mr. Gohen it is Quest; if it is not Quest it is Sam Brown; if it is not Sam Brown it will be somebody else. Now, you get up and do a little of the talking and let us older fellows have a rest. We are tired. I am actually tired of talking, and I would like to see you fellows get up and do a little talking and let me do a little of the listening, and I won't do any of the kicking.

About this emulsion cleaner, before I sit down (laughter), I do not for one minute try to make you believe that any emulsion cleaner on the market to-day is perfect. I do not believe there is one of them that is what you would call a perfect emulsion cleaner. There is not one of them that will meet all the requirements. Mr. Ginther tells us that he wants us to understand that not all his work is in the condition which he represents, but it is an occasional job. If George Westinghouse had been hounded down when he undertook to introduce his air-brake upon the railroads, and it was in a state of imperfection at that time, we would never have had the Westinghouse air-brake in the state of perfection that it is to-day. You do not want to expect too much of your emulsion cleaners at the start. The question for you all to consider is whether it is for the interests of your company to use any of these emulsion cleaners at all. If in your honest judgment you think that you are not saving money to your company, if you think that you are throwing their dollars and cents away, I say don't put one drop of emulsion cleaner on your caps; do the best you can; if you can get better results out of soap and water, or if you get better results from nitric acid, take that; some use oxalic acid; what you want to do is not to pay any attention to what anybody says unless you know it is to your benefit to follow out his advice, and, then, if it is to your benefit and to your company's benefit, why, do so. Discard the emulsion cleaner; you are not compelled to use it; I wouldn't use it if I didn't think it was of benefit to my company. And I want to say that we have not only saved dollars, but thousands, to our company by the use of emulsion cleaner. I know we keep our cars out from three to six months longer than when we used soap and water, and why shouldn't I adopt the emulsion cleaner, waiving any personal interest I have in the subject at all. There is the subject for you. It is not what my interests or your interests are individually; it is your company's interests; that is what you want to follow. And I want you to take that all home with you and if you think you are not saving money to your company, if you do not keep your cars out longer by using emulsion cleaner, and it costs you more money to keep them in the shop and varnish them, then you are doing an injustice to yourself and your company if you use one drop of emulsion cleaner.

Mr. Rodabaugh.—I want to say a few words on the matter. Our worthy friend Mr. Brazier spoke a while ago, and I was very much impressed with the support that he gave the painters, the encouragement that he gave them, and I think that would be one thing which would bring out the younger members of the association to express themselves. I know that we have talent here, we have plenty of it, if they would have the courage to get up, but I think sometimes that some of us haven't got the courage to get up and express our opinions for fear we will make some mistake, and, when we go back home, we will have trouble. I think that it is probably one of the reasons why some of the members do not express themselves. Our people give us all the support we need, always encourage us to come to the convention; that is, the Pennsylvania Company, and they are a small organization compared with some of the rest of them, but we generally have the support. I want to say one word in regard to emulsion cleaners. I have been using it for the last ten years, probably, or ever since it came on the market. I have never had any trouble in revarnishing cars. I do burn off a few cars but they must be very badly cracked before I do it. As my brother says, we would have had some trouble occasionally, but in the main we do not have any.

President Bruning.—Mr. Rodabaugh, what we want to get at is, "Is there a method of successfully treating passenger cars (going through shops for re-varnishing) which are more or less cracked, and which have recently been cleaned at terminals with emulsion or other cleaners containing mineral or non-drying oils?"

Mr. Rodabaugh.—I say, yes, we can, and we do it every day.

There is not a painter on the western division of the Pennsylvania Company, the northwestern or southwestern division, but what does that almost every day, varnishes a badly cracked car, and with a good deal of success, too. You cannot hide the cracks. That is an impossibility; we do not expect to hide them, but we can varnish a car badly cracked that has been cleaned by an emulsion cleaner. I never use any sandpaper in revarnishing a car. We clean our cars probably once every thirty days. I often get a car that has been cleaned fifteen days before I get it, with an emulsion cleaner; I get it into the shop for revarnishing; I simply use modoc soap and take a little ivory soap, slice it up, mix that together, let it stand over night, put a little pumice stone in it and wash the car, touch up the bad places in it; sometimes if a car is very badly cracked I cut it in. That is about all the process I have.

Mr. Gohen.—Just good, ordinary common sense.

Mr. Rodabaugh.—That is it, exactly, and that is all we want to use in our business; common sense and sound judgment.

President Bruning.—Gentlemen, Mr. Copp's motion is before the house, to close the discussion on this subject.

Mr. Copp.—My motion was simply to take up the papers on the next subject which is so closely related to this.

President Bruning.—It has been moved and seconded that we close on subject No. 1 and take up subject No. 2. Are you ready for the question?

Mr. Miller.—I would like to know which way this convention is going to decide this question. Can we do it or can't we do it? We all admit that we can take a car that is not badly cracked, that has been treated with emulsion cleaners, and revarnish it successfully; but the question is, Can we successfully treat passenger cars going through shops for revarnishing which are more or less cracked? We want those that are more cracked than less. What I would like to know is, do these gentlemen maintain they can take any of these cracked cars which we are at times compelled to run through the shop for revarnishing and treat them in an absolutely safe manner for revarnishing and never fail. I am very frank to admit that I can do it in the majority of cases but I cannot do it in all cases.

Mr. Butts.—I move that it is the sense of this association that a car can be successfully treated when it is more or less cracked.

President Bruning.—That motion is out of order unless Mr. Copp withdraws his motion.

Mr. Copp.—I will withdraw my motion.

President Bruning.—Does that meet with a second?

Mr. Gohen.—I second that motion.

President Bruning.—Gentlemen, it has been moved and seconded that it is the sense of this association that a passenger car can be successfully treated for revarnishing that is more or less cracked and which has recently been cleaned at terminals with emulsion or other cleaners containing mineral or non-drying oil. Are you ready for the question? As many as are in favor of that motion will rise to their feet. The Secretary will please count them.

Acting Secretary Cook.—I make it 40, Mr. President.

President Bruning.—Those who are opposed to the motion will please rise to their feet. How many, Mr. Secretary?

Acting Secretary Cook.—Eleven, Mr. President.

President Bruning.—The motion is carried. It is not necessary for a motion to take up Subject No. 2. We will now take up Subject No. 2, which is:

"In a material sense, what progress has been made in terminal car-cleaning?"

M. Bown.—Mr. President, I would beg leave for a little question of privilege. Referring to Mr. Bazier's talk to us on the encouragement they gave their painters, I would like to state that the Boston & Maine has four representatives here, the New York, New Haven & Hartford have four, and I have no doubt many other roads are equally well represented, for which we all feel very thankful. I know our master car builder, Mr. Appleyard appreciates the work we are doing, and he does his utmost to get the boys to come and attend the meeting. We all appreciate those things.

President Bruning.—I will state that the L. & N. has four men here. Mr. Leads is heartily in favor of the association.

Is Mr. Vogel in the house? We have not his paper here. S. H. McCracken is next.

Mr. McCracken's paper was then read as follows:

PAPER BY S. H. M'CRACKEN.

Thanks to Brother Quest, for it was he who offered this subject to our Advisory Committee, I believe we have at last struck the keynote to the car-cleaning question.

Judging from the great number of cleaners on the market to-day, you would naturally think that we were making rapid progress, in a material sense, but I believe the quantity of these cleaners far exceeds their quality. We all know how easy it is to get wedded to a certain material, and think, and even argue, that there is no other that will do the work as well or take the place of the one now in use, etc. Such ideas are the veriest nonsense, and are usually prompted by prejudice or some selfish motive, and are very detrimental to the success of our railroad companies; and, as long as this practice prevails among members of our association, just so long we will have subjects like the terminal car-cleaning question unsettled. We are no nearer a settlement of this subject now than we were four years ago, notwithstanding the fact that our superior officers have been urging an early expression in the case from our association. They want to reduce the enormous expense which they necessarily have to pay under the present system of car cleaning, and they are looking to the members of this association for relief.

My opinion is that, so far as oil cleaners are concerned, our progress has been very slow indeed, notwithstanding the fact that there are so many different kinds of them in use. I believe that if the same efforts had been put forth to make soap and water a success in terminal car cleaning that has been done with oil cleaners, we would to-day have an ideal cleaning system on all our railroads at one-half the expense of the present cost. I would like to know if we foremen painters are progressing as rapidly, in a practical way, as the manufacturers of oil cleaners are progressing in a material or financial way.

The material used in anything, no matter what it may be, is of great importance. Our railroad companies in building cars, engines or buildings of any kind, and, in fact, anything that they make or build, consider closely the quality of the material to be used; so the material used in car-cleaning is no exception to the rule. We should take equally as much care in selecting a material that will do the work properly and economically; as the material used in cleaning cars is of equally as much importance as the steel that is used in constructing an engine, in proportion to the cost thereof.

I think that if we wish to get a system of car cleaning that will be entirely satisfactory to our railroad companies, we should first determine what is the best material to use to bring about these results—a material that will not cost a fortune to buy, and, at the same time, do the work as it should be done—not leaving any bad results. We do not want a material that will clean our cars in fifteen minutes, if, after having cleaned the cars a few times with it, our varnish is badly damaged because of it; for, in that case, what we save in time we more than lose in the damage done to our varnish. Neither do we want a material that is so slow that it will take an unreasonable length of time or amount of labor to get favorable results just because it does not change the varnish.

Now, I believe this to be the case with all oil or emulsion cleaners, which are on the market now. I know it to be the case with all I have ever tried, and I have given a number of them thorough tests; and, when I find one that will clean, it leaves bad effects, and those that do not change the varnish, etc., do not clean. As additional authority for this statement, I notice in a paper that was read before this association at a former meeting, though its author is a strong advocate of oil cleaners, yet, according to his own statement, after having tested a number of them, he found that those which clean the car damage the varnish, and those that do not damage the varnish do not clean. I think the men who manufacture these oil cleaners are progressing faster in a financial way than the painters who use them are progressing in a material way.

I would like to know which would be the most economical to our railroad companies—to rub our varnish off with oil cleaners, which are full of grit, acids, etc., at a much greater cost for both labor and material, or to "kill the gloss," as some of us say, with soap and water at a saving of 50 per cent. in cost of cleaning, and have our varnish wear one-fourth longer? It seems to me that this oil system makes gloss come pretty high to our railroad companies.

Besides the grit which these emulsion cleaners contain, there is coal, or crude oil and acids of various kinds put in them, which penetrate the varnish and leave bad effects.

Advocates of oil cleaners argue that oil is the life of varnish, and that in using oil cleaners we prolong the life of our varnish, etc. Now, it is true that oil is the life of varnish; but not the kind of oil that is put in emulsion cleaners. If I were to argue to the members of this association that coal oil was a good thing to put into varnish; that it would add to its life, etc., you would hiss me out of this convention hall. Yet, you oily fellows argue that an oil, of which it would only take a few drops to ruin a bucketful of varnish before it is applied to the car is the proper thing to rub into the varnish after it is on the car. How inconsistent is such an argument!

Now, it seems reasonable to me that an oil or an acid which is so destructive that it requires only a few drops to ruin a pailful of varnish before it is applied to a car would necessarily damage the varnish after it is applied; and when you stop to consider the number of times your varnish is soaked with these oil cleaners, and how they penetrate the varnish, it is surprising to us how varnish stands as well as it does.

In washing a car with soap and water, if it is done properly, it will not damage the varnish one-half as much as an oil cleaner, and it can be done 50 per cent. cheaper. Two men, at 10 cents an hour, can clean a car, including the windows, in one hour with 10 cents worth of material. The very moment the soap raises the dirt and grease the water should be applied. Thus, no sooner does the soap come in contact with the varnish than it is washed off, leaving the car in no worse condition than if it had been run through an April shower of fifteen minutes' duration. This is done at a cost of less than 35 cents; and the car is cleaner than if it had been rubbed for four hours by these same two men, using 25 cents worth of material—a cost of $1.05 per car, or a saving of 70 cents per car in cleaning. Now, to illustrate, let us take a railroad system which has 1,500 coaches. If they clean their cars with soap and water it will cost them $8.40 a car per year, and at this rate they will spend $12,600 annually for cleaning cars. If they use oil cleaners, it will cost them $25.20 a car per year, and they will spend $37,800 annually for cleaning cars.

Now subtract $12,600 from $37,800, and we will have an annual saving of $25,200 in favor of soap and water as a material for terminal car cleaning, which I dare say is worth the consideration of any railroad company. I believe that the cost of terminal car cleaning of any railroad company who have as many as 1,000 cars, and who now use oil cleaners, and keep their cars clean, can be reduced by the proper use of soap and water to such an extent as to pay the salary of the president of the company each year with the saving.

Now the Committee on Tests may bring in a nice, smooth, oily report, favoring oil cleaners, but we should take it with a morsel of seasoning, for it should be remembered that they will probably have come to their conclusions through office theory or by shop experiments, made by their next best man on small bits of boards. I have made these tests myself on actual cars—I did the work myself; and with my cars doing duty on the road, I have watched the results through all seasons and all kinds of weather—Summer and Winter, hot and cold, fair and foul, sunshine and showers—and I am convinced that my conclusions are right.

We master painters should make our own tests personally—not that we haven't men working for us who are perfectly trustworthy—but it stands to reason that the foreman painter's opinion is worth more to the company for whom he is working than the opinion of any man working under him. If not, why not promote the man to the position of foreman. We should take the same interest in testing material to be used on the property of a railroad company as though it were our own. If you are an advocate of oil cleaners, and a sample of soap is sent to your shop for trial, you should lay aside all prejudice and let your generosity, of which we are all brim full, have full sway, and give the soap a fair and thorough test. It was in this way that I discovered what I consider the best and cheapest car cleaner on the market. One would think, to hear some of these anti-water men talk, that their coaches had to be taken in when it rained, and all passenger trains annulled on rainy days, etc. To hear them argue against the use of water and soap for terminal car cleaning at convention times, and to read the long-winded articles they have published in the *Railroad Digest* between times, one would think, if one did not know better through experience, that a drop of water on a varnished surface would cause the varnish to "pop off" or turn white or disappear as if by magic or do something else awful and have to be "shopped" for varnish immediately.

Now, I know from experience that this is not the case. I have had experience with cleaning cars with oil cleaners of various names, which were all about alike in nature. I have also used oil cleaners of my own make. But in every instance there were bad results, which it is not necessary to enumerate here, as they are well known to all of us.

It is a fact that varnish is manufactured with the idea in view that it will come in contact with a great deal of water, after being applied to a car. Consequently, when the water comes—no matter whether it is from the clouds or from the nozzle of a hose—it is prepared to stand it. Suppose a firm wanting to sell us varnish should tell us they had a good varnish which would stand the hot rays of the sun, the gas, smoke and cinders from the locomotive, and all these things combined, but it would not stand to be rained on, or washed with water. We would pass him up right there, and get our varnish from some one who made, what we would term, a better varnish.

The inconsistency of the argument used by the people who advocate oil cleaners, if nothing else, should be enough to cause all railroad companies to adopt the soap and water system of cleaning cars.

Now, it does not injure varnish to wash it with a mild soap and water, two or three times a month, one particle more than if it had been rained on that many times. Yet the majority of the members of this association have given up all hope of ever trying to make a success of any cleaning material that might be used with water, and are working like Turks to get these expensive oil cleaners into use. It rains on our cars anyhow, and if we use oil cleaners, which we all acknowledge injure the varnish more or less, we get the double injury of both the oil cleaner and the water.

When I cleaned cars with an oil cleaner, I varnished once a year with three coats of varnish. One cleaning cost then $1.25 a car. Under my present system of cleaning with soap and water I can clean a car for less than 35 cents. I now varnish my cars only once in eighteen months, using only two coats of varnish, and I actually get better results from two coats of varnish cleaned with soap and water than I did from three coats cleaned with an oil cleaner.

And this brings us face to face with another considerable saving in favor of soap and water as a car cleaner. When I used oil cleaners, it cost about $27 a year for me to keep a car properly varnished. Now that I use soap and water, it costs only about $21.25. Here we have a saving of $5.75 a year on one car in the expense of varnishing. To illustrate, let us again take a railroad system that has 1,500 coaches. This would mean a saving of $8,625 a year in the expense of varnishing. Add this amount to the $25,200 saved in cleaning, as shown above, and we have a total saving, in round numbers, of $33,825 in favor of soap and water as a material for terminal car cleaning, which again I say is worth the consideration of any railroad company.

My experience has taught me that two cleanings a month is sufficient to keep a car in a presentable appearance, if it is wiped with dry, clean waste every day between cleanings, and I use the same soap on the inside of my cars that I do on the outside. I know that I do not have the cleanest cars in the world, but I also know that the appearance of my cars is far above the average, and according to the figures I have seen given for cleaning on other roads, my cleaning is done much cheaper than on other roads which I know.

When we were boys, "serving our time," we were taught to clean our varnished surface with soap and water, but now we have evolutionized, as we think, with this age of push and progress. My prediction is, notwithstanding the fact that there are very few members of our association in accord with me now, that, in harmony with the old scriptural adage, "Dust thou art, and unto dust thou shalt return," as soap and water was our beginning, so soap and water will be our ending, in terminal car cleaning. And it is my candid opinion that the departure from the old-time method in this instance, while it has not been a retrogression, in the literal meaning of the word, it has not been profitable progress.

President Bruning.—We expected to have two or three more papers on this subject, but unfortunately at the meeting of our advisory committee there was a great deal of complaint made that we were selecting the old members all the time, so the advisory committee thought they would select some of the younger members, and this has been the result—we have only one paper. This subject is now open for discussion.

Mr. Butts.—As I have been an advocate of emulsions for about five years I would not naturally agree with Mr. McCracken. I want to start out by saying that if Mr. McCracken has not found an oil cleaner that will clean varnish without injuring, why, he has not tried all the oil cleaners, and, as Mr. Gohen here said a while ago that the proof of the pudding was chewing the string, I have got the string right here on that subject—quoting Mr. Gohen—which I would like to have all the members examine. (Referring to board.) It is a piece of board that was taken off a car that went into service the first of the year. It ran until the first of June and one part of the car was raked; it had no cleaning; one-half of the board that you can see there has been cleaned with water alone, without any soap, and the other half has received one cleaning, on the 16th of June, with an oil cleaner, and been put out in the worst exposure that I could possibly get for it since the 16th of June. I am willing that the members here should pass judgment whether that varnish has been injured or not. I know that anybody can say "yes, that is a panel that you have been rubbing and polishing until the friction has brought it up to a gloss." If my word is good for anything there has not been touched any more than with a handkerchief to dust it off since the 16th of June, up on the roof of the shop. Also, in service since that time, since the 24th day of June, we have had two cars especially running through the Tunnel in the Grand Central Station; one of them makes four trips a day and the other goes through every other day. Those two cars were cleaned with the material that was used on that board, the 24th of June, and I would be glad, if any of you are going to New York, to have you go down there and to show you diner 416 running on the Lake Shore Limited, or smoker 1943 on the Croton Local—a coach that has been running now beginning its ninth month; it has been cleaned once with an oil cleaner. The gloss on that car that has been cleaned with an oil cleaner is a hundred per cent. better than any other car in the yard that has been in service thirty days.

President Bruning.—Mr. Butts. We are getting off the subject altogether. The question is this: "In a material sense what progress has been made in terminal car cleaning?"

Mr. Butts.—I beg your pardon, Mr. President, I think I am arguing the point that we have made progress and I want to prove it. I call for the association to sustain me in that respect. We have made progress in oil cleaners and that is the result of it.

President Bruning.—That is what I want you tell them—if you think we have improved in the past year.

Mr. Butts.—This cleaner has been used within the past three months. That is why I am citing this to you. So if I bring a panel in here I know I am open to the criticism that I have been rubbing up that panel. I want to cite those cars to show you. They have received just an ordinary wiping-off since that time. I want to disagree with Mr. McCracken emphatically on the soap-and-water question. I had orders from Mr. Brazier to take two cars in the Grand Central Station and apply the soap-and-water process of cleaning to them to try to prove whether Mr. Ball's statement at our last convention was so or not. I turned the matter over to our foreman-cleaner, instructing him to use as mild a soap as possible and clean those cars. I cannot show you the cars, for they have been painted over since. If they had not been there would not have been any varnish left on them. I have never seen a car in thirty years' experience that has been cleaned once a month with soap and water that has been in six months' service but what any man would say that car must go to the shop, to preserve its ornamentation. I do not hesitate to say that if any man will come to the Grand Central Station and clean a car with any kind of solution with soap and make it clean, for six months, without destroying the varnish on it, I will give him my check for a hundred dollars. If soap and water can be used in that way I will adopt it to-morrow. I am willing to adopt it. I have no interest whatever financially in any cleaner ever made, don't expect to have, but I am after the cleaner to maintain our equipment the best it can be done: if it can be done with soap and water I would like to see it done. I have tried it again and again, and failed every time; never have I seen a car that could be cleaned with soap and water successfully. The moment you make an alkali substance strong enough to remove the dirt you attack the varnish. That has been my experience. While I am talking about cleaners, I want to say that notwithstanding the number of oil cleaners that are in the market, I agree with our brother that he has never been able to get hold of one but what will dim the varnish, and I believe that the reason it does dim the varnish is that the water solution that is in those cleaners is what does the dimming more than anything else. An oil emulsion can be made, I think I can prove it, that has no acid and no alkali in it, which will clean a car successfully and clean it reasonably quick. Our brother makes the statement that the cleaning is being done on his road cheaper than on any other road. I hope it is. I am going to find out when I get a chance how much it costs them. We adopted the oil-emulsion process of cleaning cars two years ago the first of last June, on the New York Central, and I am perfectly willing to state what our cleaning cost us per hundred miles. The best and most accurate statement I can get is on the division where our heaviest cleaning is done, that is running into the Grand Central station in New York, where we get the tunnel service, where we have nearly all of our special cars and dining cars to take care of. We show a small percentage more than twenty-eight cents per hundred miles for all cleaning; that includes all terminal cleaning, dusting, sweeping, blowing-out of cushions with air, scrubbing the car inside thoroughly, from the ceiling to the floor, once in three months, painting the floor, painting the pipes, cleaning the car outside with emulsion cleaner, from the upper decks, cleaning the irons, cleaning the trucks and opening the valves; that is all included, once in three months, and yet we are keeping our total expense within twenty-eight cents per hundred miles. We find that, after a car is cleaned with oil emulsion, if it is properly wiped with dry waste, it keeps in good condition. I do not advocate cleaning a car with oil cleaner once in thirty days at all; I think once in three months is sufficient, if it is cleaned with something that will stand dry-wiping afterwards so as to save expense after that to keep the car in condition. All I want to say further is that I hope that every member in this room will spend some little time in experimenting for himself. I have all the respect in the world for men in the commercial line; I treat them all royally and they treat me royally; I take everything they offer me and I go at it conscientiously and give it a thorough test, and if any man will come to me to-day with a better cleaner than I am using and I can be convinced that it is better, I will recommend our people to buy it to-morrow. I want the best. I do not believe, and I can prove it, that oil cleaners are successfully used and economically used; varnish can be protected with an oil cleaner and equipment can be made to look very much better than by any other process.

Mr. Waggoner.—I would like to ask Mr. Butts about those two cars that he speaks of, that he cleaned with water what did they cost?

Mr. Butts.—It would take two men about two hours to clean a car with water and soap—or a little more than that, if the car is dirty enough to need it. Take a car and run it through our tunnel in New York city for one week, and if you will come down there and remove the dirt with soap and water without injuring the varnish you can do something that I consider an absolute impossibility. After these cars had run a month, I had to clean them with water and they were streaked; in spite of all I couldn't get soap enough on there to remove the dirt without making streaks. You cannot put alkali on a car that has been running through our tunnel to remove the greasy substance, without having it trickle and run down, and if you have a solution strong enough to dissolve that substance, it is bound to eat more in one place than another. That is why I must have an emulsion or else I cannot get the surface clean, smooth and even. A gentleman came to our road the other day with one of the best soap solutions I ever saw, imported from England. I was telegraphed for, to come to New York to give it a trial. I said "I'll sit down and look at you; there's the car; go ahead and clean it." Well, I was very sorry I was there to look at it, I assure you. That car will have to go to the shop in about a month. I had to get an extra man to help him with a hose to rinse it off before it spoiled the car altogether, and oil it up

afterwards to avoid sending the car in immediately, that soap solution is so mild if you make it weak that you can put it on highly polished varnish, and it will not make any impression for twenty minutes, but apply it to one of our cars that has been through the tunnel a month and see where you come out. I think a car that is dirty would cost a dollar, at the very least, for the labor of cleaning it.

Mr. Waggoner.—My idea in asking the question was that if you can clean a car for less than thirty cents, as Mr. McCracken stated, I would like to get some information as to a way of cleaning a car at so little cost.

Mr. Fitch.—I would like to ask Mr. Butts his method of cleaning the interior of cars. I think you said you cleaned them once a month.

Mr. Butts.—Once in three months. We are using two kinds of material. I use castile soap for the head lining, where the smoke from the lamps gets on it. I find that with acid oil emulsion we cannot clean them successfully. We clean our car down to the base of the lower head line with castile soap. Then if it is very dirty we take our oil emulsion. Before that, if it is a car that has had an easy run—there is quite a difference in the runs on our road—we sponge clear to the floor with a very weak solution of soap; very weak; almost no soap in it; it wouldn't clean the outside of a car, that solution wouldn't touch it; and those cars have been rubbed on the inside with oil, so that it resists that soap. If they are in the same condition that a car is outside I would not dare use a soap strong enough to dissolve the dirt that is there, but having been once rubbed down with oil, of course the dirt is on the surface of that oil and a very mild solution of soap will assist, but it is not strong enough to take the dirt off the outside of the car at all.

Mr. McCracken.—I only state for the benefit of those who doubt my statement as to whether I could clean a car for twenty-five cents or not, that it can be done without a doubt. In our city we have a water rate, I believe, that costs us fifteen cents for a thousand gallons of water and we use a 3-16 in. nozzle that will run two gallons per minute at the pressure we have there. We take a handful of soap and dissolve it in a bucket of water; one man takes a little handle brush, goes ahead and scrubs that car, while the other man turns the nozzle of the hose on; he sprays the water right on the place where the other is scrubbing; consequently, just as soon as that brush and the little solution of soap raises the grease and dirt, the water is there to take it off, and it does not damage the varnish. I know that material of any kind that is so detrimental and destructive that it will have an action of this kind on varnish before it is applied to a car necessarily will damage it after it is on. I have three little panels here. They were all off one board. I took a brush of straight finishing varnish and varnished one panel, and I put a teaspoonful of water into a gill of the same varnish and varnished the second, then I put a teaspoonful of the best cleaner I could get hold of into a gill of varnish and varnished the third. You can readily see there is no gloss on that third board; the gloss has gone; the crude oil or whatever it was that was in the cleaner has destroyed the life of that varnish; there is the first one, the straight varnish, you cannot tell it from the varnish that had the water mixed with it. I claim that a car can be cleaned for twenty-five cents with soap and water, and it will not damage it a bit more than an oil cleaner. We will all be willing to admit that there has been a great deal more pains taken since these oil emulsion cleaners came into use, there has been more pains taken to make them a success, and if we would now discard the oil cleaners and take the same pains to make water a success that we have with oil cleaners, why, we would all have different results, I believe.

Mr. Gohen.—Mr. President, I never have been more surprised in my life than I have been in the last twenty minutes or half hour. Of course, I admire Mr. McCracken's paper; it is right, he has a perfect right to his opinions, and it is right and just that he should express them, but in all candor I must say that Mr. McCracken should hew a little bit closer to the line of truth. Now, gentlemen, that is a broad assertion. Mr. McCracken, I want to ask you who the member was who wrote that paper in which he said that all emulsion cleaners damaged the varnish; wasn't it I?

Mr. McCracken.—I believe it was, sir.

Mr. Gohen.—Yes sir. Now let me read my paper. I have it here.

Mr. McCracken.—I do not think that was in your paper. If you read the statements that Mr. Harris made there of the tests.

Mr. Gohen.—I have it right here.

Mr. McCracken.—Do that, please; just read the report that Mr. Harris gave you on the tests.

Mr. Gohen (reading from the proceedings of the 31 Annual Convention of the Association):

Indianapolis, August 31, 1900.

"Mr. J. A. Gohen, Master Painter:

"Dear Sir: Answering your next attached relative to making a test of the four samples of liquid car-cleaner sent us. Will state that we gave these cleaners a practical and thorough test, and will state the Marvin Cleaner is of no use in our cleaning, as it will only remove the loose and surface dirt, makes no impression on dirt baked on the varnish. In making the test with the other four cleaners, namely, Modoc, Imperial, Cleanola and Ko-Ko Cream, find there is but very little difference in the amount of labor required in their use, the odds being in favor of Modoc and Cleanola. After cleaning with the four latter cleaners the polish on varnish is about the same. Our experience with car cleaners has only been in the use of the Modoc, therefore, am unable to offer an opinion as to what effect these new cleaners will have on the varnish. However, will state that Ko-Ko Cream is very hard on the hand, as it bites and smarts the hand. We used this cleaner on combination car No. 320, which was a very dirty car, and in many places paint was exposed, and wherever the cleaner came in contact with the paint it turned the paint white, indicating that there was acid in this cleaner. We made a further test of the five different cleaners by taking a fresh varnished panel and applying a coating of the cleaner on a space of about 4-inch circle, and set the panel in the sun from 11:15 to 11:55, and then cleaned the panel off, and found the Imperial cooked the varnish; the Modoc slightly faded it, while the Ko-Ko Cream discolored the varnish, leaving it a brownish cast, while the Cleanola and the Marvin cleaner had no effect whatever on the varnish."

Now that is the report Mr. Harris sent. "This report speaks for itself," as I say in my paper and continuing, "I wish to say, however, that the test to which this panel was subjected was an unusually severe one. It was one in which the panel was subjected to the perpendicular rays of the sun at nearly midday, in an open space: The cleaners were all heavily spread on the panel and it was then placed on the ground. No such test would be made on any car, nor was there any damage to varnish apparent on any of the cars cleaned with either of the cleaners. In the case of the combination car No. 320, spoken of in report, the Ko-Ko Cream did attack and bleach the paint where the varnish had been worn off—that is, on the water table of the belt rail. The Ko-Ko Cream, the Imperial, the Cleanola and Modoc are efficient cleaners. The Marvin is certainly worthless, so far as efficiency is concerned. It is certainly not detrimental to the varnish, and it doesn't appear to be much more so to the dirt."

Now, gentlemen, if I have ever made a statement in my life in which I have said that these cleaners, especially in this convention, in this paper; if I have made a statement that they have all damaged the varnish, I fail to find it in that paper. Yet my friend McCracken says I say they all damaged the varnish. Now, Mr. McCracken, you should read that report carefully.

Mr. McCracken.—I believe you misquote me, sir.

Mr. Gohen.—Let me say I want to be right; I certainly do not wish to misquote anyone—Mr. McCracken says:

"As an additional authority for this statement, I notice in a paper that was read before this association at a former meeting, though its author is a strong advocate of oil cleaners, yet, according to his own statement" (that is, the author of that paper which you just heard read) "after having tested a number of them, he found that those that clean damage the varnish, and those that do not damage the varnish do not clean."

Now there you are. Gentlemen, I let you judge for yourselves. Now I want to say, Mr. McCracken, that if you can clean a car for twenty-five cents, and you can save the company twenty-five thousand dollars a year in cleaning the cars, which will approximate the salary of the president—I don't know whether our president gets quite that much or not, but I suppose he gets a fair salary. I want to say to you, Mr. McCrcaken, that if you will make your word good, that I will pledge you

my word to go right down to my superintendent of motive power, just as soon as I get home, and I will ask him to give you charge of the car cleaning on our road, and I don't care what your salary is, I will ask him to triple your salary if you will save to our company twenty-five or thirty or forty thousand dollars a year? Will you accept that position if I can get it for you?

Mr. McCracken.—I will only be too anxious to.

Mr. Gohen.—Will you fulfill your part of it?

Mr. McCracken.—I certainly will.

Mr. Gohen.—Will you guarantee what you say here?

Mr. McCracken.—Yes sir.

Mr. Gohen.—All right, sir. I will make the proposition to my superintendent of motive power and see whether he won't give you this job. I would certainly like to have you come over on our road and make that improvement. Mr. McCracken is certainly entitled to his opinion. I like to have a man decided in his opinion; I like to have a man stand up here and say he can do things and knows he can do them; I have said things and people have disputed it; I knew I could do it; I didn't blame them for disputing it; I do not want Mr. McCracken to blame us because we believe that emulsion cleaner is better than soap and water; we have tried both of them, and I do not know whether you have tried the emulsion cleaner as much as we have, or enough to demonstrate to your satisfaction that soap and water is not the thing to put on your cars. Possibly you have given it as much thought, as much care and worked as hard to accomplish the end as some of the emulsion men have done, who I believe have done so honestly, Mr. Butts gets up and tells you as a man, "I have no interest in any cleaner whatever." I will be just as frank with you. I have an interest in a cleaner; but that interest is so infinitesimally small as compared with the interests that I have in my railroad company and its prosperity, that ten thousand times the amount I would get would not make me go one step further, not a step. Now then, we want to know which is best, and I want to say that I have gone down the line with the soap and water and I know that when Mr. Butts gets up and tells you that he cannot clean his cars that run through those tunnels, with soap and water, without damaging them, I know he is telling the truth. I have been there. There is not a man within sound of my voice who has had any experience in car cleaning but who does know that he cannot take a dirty car and clean it with soap and water without damaging it, especially in the summer time; and I presume there will be some report of the tests made on this car cleaning before the association adjourns which may possibly say to emulsion-cleaner men, "You are all wrong; you don't know what you're talking about at all." It may be that they will say the same to the soap-and-water men. I believe in the candor and honesty of Mr. McCracken, I believe that what he has said here he believes to be the truth. I am just as conscientious and I believe just as religiously as he does. He believes in soap and water; I do not. It has been demonstrated to me; it has possibly been demonstrated to Mr. McCracken on the contrary. Mr. McCracken, I certainly shall make your proposition to my superintendent of motive power because I know he is not a man who is going to throw any of the dollars and cents of his company away, and if I were throwing them away, I know he wouldn't keep me on that road twenty-four minutes.

Mr. Copp.—Mr. President, I would like to supplement what Mr. Gohen has said with a similar proposition for the Boston & Maine. There is a little field in the Fitchburg division yards of the Boston & Maine Railroad for similar treatment. If Mr. McCracken will take the Hoosac Tunnel cars and do with them as he says he does with his, he will astonish me and a great many New Englanders.

Mr. Butts.—I would make a similar offer, Mr. President. If Mr. McCracken or any other man will come over to our place he will have all the show possible. All that I can do, all the influence I can use with my superiors shall be given him conscientiously, if he can do what he says he can do. I won't ask him to save $25,000; I will put it down as low as $5,000; and I will recommend that he be employed by our company at a bigger salary than any cleaner ever had.

Mr. Miller.—Mr. Chairman, I am not opposed to soap and water. While I think it is a good thing in its place, if judiciously used, yet if Mr. McCracken can clean cars for twenty-five cents a car, I am reasonably certain that I have influence enough to make him a similar offer as the preceding speakers have just made him, on the D., L. & W. Railroad.

Mr. McCracken.—I will have to decline all offers—all except Mr. Gohen's. I accepted his first.

Mr. Gohen.—All right.

Mr. McCracken.—I did not, in saying that, mean to cast any reflections on the ability of any foreman here.

Mr. Gohen.—We know that, Mr. McCracken.

Mr. McCracken.—I do not want you to take it that way.

Mr. Gohen.—I do not.

Mr. McCracken.—It seems to me though it was drifting in that line. I suppose all you gentlemen are perfectly capable, and I suppose your railroad companies do too. If they do not they would not employ you to fill your positions. But I am thoroughly convinced if you will put forth the same efforts to make soap and water a success, as a material for terminal car-cleaning, as you have for emulsion cleaners, that you would see a great deal of difference. I think when you discarded soap and water to take up emulsion cleaners that you just let it drop with a dull thud and never gave it any thought whatever. You thought at the time of using soap and water that it was the natural thing to use and you put on the soap and water and washed it off and that is all there was to it and you didn't take the pains. That is my argument. And I believe if you would go back, some of you men who are advocates of oil cleaners now, and take up the soap-and-water system and give the time and attention that you gave to the cleaners, you would see a great difference.

Mr. Lord.—I would say in reference to the Fitchburg Division of the Boston & Maine that I have been located there now going on seventeen years and never until very recently have they made any attempt at oil emulsions for cleaning, but have used soap and water wholly, and it seems to me that in that time they ought to have a little experience in getting down to soap and water, but I have never seen them cleaning a car yet with soap and water, but what it was streaked from one end to the other, and not fit to send out on the road. I have seen some that they couldn't clean unless they had more soap than they did water and then they wouldn't get it all off.

Mr. McMasters.—I would like to ask Mr. McCracken if any of his cars run through tunnels, or about what the mileage is, about what they run per trip?

Mr. McCracken.—They do not run through tunnels.

Mr. McMasters.—About how many miles per trip do they make?

Mr. McCracken.—They run about 300 miles, sir, in 24 hours. We clean those cars twice a month, as I stated, with a long-handled cleaner and water.

Mr. Butts.—Mr. President, may I have one more word? Mr. McCracken seems to doubt the experience we had or effort we made with soap and water. I want to relate, in a few words, my experience with soap and water. When I went on the Northern Pacific Road a number of years ago, there was a soap manufactured in Minneapolis then, a new thing, called Cleanse-all. It was said to be a purely linseed-oil soap, and the agent wanting to introduce it, came to my shop and asked me to make tests. I went into that matter conscientiously and made some tests. From that day to this I have been a friend of that particular brand and kind of soap. It is one of the finest things I ever had anything to do with. It is nearly a pure soap; the chemical analysis shows no free alkali, or scarcely any at all; and, being combined with oil, it does not injure the varnish in that respect. I cleaned the general manager's car with that, sent it down from the shop to the yards and got a telephone message right away, to know what I cleaned that car with; it looked fine. I thought I had struck something new that was going to help me out. I cleaned that car, mixed that up myself very carefully, and saw it applied, and I didn't put it on a particle stronger than was necessary to remove the dirt. That car went into service and went through the Bad Lands over into Oregon and back again, got dirty and was sent into the yard. I cleaned it again very carefully, and I noticed the gloss was diminishing rapidly. I cleaned that car the third time, and then I got another telephone message asking what I had been doing to the car to spoil it; why didn't I clean it with the same substance I did before? I was charged with ruining the paint, and I had done it too. As I say, I have used that particular soap for inside cleaning, where I do not intend to revarnish, all these years since; but I was never able to combine it with water and

take the dirt off a dirty car with it, the third time, without doing the car positive injury. That is more than fifteen years ago. I didn't clean any car with my emulsions for over ten years after that. That has been my experience with soap and water.

Mr. Gohen.—We have a gentleman here who is connected with our road. He happened to drop in this morning, while visiting the Pan-American. He is our foreman at Cincinnati, has charge of all the inspectors, cleaners and repairs in our yard there, and he is a man of varied experience, I think, in the matter of cleaning, and I would just like Mr. Eicher to tell the results of soap-and-water cleaning as compared with emulsion cleaner. Now, I do not know what he is going to tell you. There has been no coaching on this thing, or anything of the kind. I do not actually know what his honest opinion is of soap and water as against emulsion, but I will take the chance. Now, Frank, tell us, honestly, your opinion of them and I think it will have some weight, as you have had twenty or twenty-five years' experience in that business.

Mr. Eicher.—Well, gentlemen, I just dropped in here and I have gained more information in regard to car cleaning than I believe Mr. Gohen could teach me in a year, by hearing you speak, and I think all our foremen car-cleaners ought to be at your conventions. But the question is about soap, and I say soap is an injury to the car, no matter how you use it. I will explain to you why. When we used soap-and-water, a soft soap, as they called it, to clean the cars, we would go over the car and our window-cleaners would follow us right up, for they didn't want that to get dry on the window; as soon as it would get dry on the window they would have to get pumice-stone or something else to get the glass clean. If they have to do that on the glass, how much more effect would that have on the varnish that they could not rub down with chamois and pumice-stone or whatever you may use? So it certainly is an injury to your varnish. The soap remains there, dries in and eats it if they do not get right at that glass. Now, the same thing that was on the glass, is on your varnish, and how much more it would injure your varnish than it would your glass I suppose every one of you will know. So I have no use at all whatever for soap to clean cars. You want to get something with which to clean your cars that you are satisfied cannot injure your varnish, because you have not got men for $1.25 a day who have the brains to look over the varnish and take the pains with it that somebody would who gets $2.50 or $3.00 a day. In all my experience I have found that soap is no good on a car, no matter in what shape or how it may be used; it is injurious to paint and varnish.

Mr. Lanfersiek.—It seems to me, Mr. President, that if soap and water were not injurious to varnish, all railroad companies would still be using soap and water. Railroad companies did not know how they could clean cars when they first built them, other than by the use of soap and water, and that position was occupied by them from the time that railroads were first built in this country; but, after the use of soap and water on them they thought that it was necessary to use something else. As Mr. McCracken said in his paper, if the railroad companies would try to use soap and water with as much care as they do emulsion cleaners, they would do better. I will say right here, and I believe the assertion will be coincided with by every man in this hall, that every foreman painter on every line in the United States, when the use of soap and water was at its height and he had to take care of a special car, he would take extraordinary care in cleaning that car; he would take the best pains he knew how, so that it would not be injured, but it was impossible for him to do it, and the consequence was the cry raised up "we must use something besides soap and water; we must use something that has oil in it," and the result has been the oil emulsion cleaners. While it is true that it may not be perfected yet, we are in the right direction, and I think the time will come when every man will say that emulsion cleaners are the best.

Mr. Fitch.—I would like to ask if it is not a fact that nearly all railroads that are cleaning cars without using emulsion cleaners are cleaning them without any soap at all, simply washing them off with a hose, scrubbing with a brush, turning the water on, rinsing them off and letting them dry without any soap or chamois or anything of that kind? Is not that the universal way now outside of the emulsion cleaner?

Mr. Marsh.—I instruct my car-cleaners, Mr. President, to clean with oil emulsion. I won't let them use soap, because they cannot do it in the hot sun. The sun dries the soap right into the varnish; you cannot use it in the summer. I have a newly painted train, and for six months I have been testing that train, cleaning it off with cold water. Now the time has come when I have got to use soap or oil emulsion on these cars. I am going to use oil emulsion, which I have used on other cars for the last five years. We had a newly painted car that went out to Colorado to New Mexico, and came back. I was surprised to see that car. It was full of sand and dust. I took some cold water and washed it off. That was no good. The car stood in the shed for five days. For three days I washed it with cold water; the fourth day I used Modoc; I got the sand all out of it; I used white soap and modoc. That was an oil cleaner. I find our cars look better with it.

President Bruning.—Have you made any progress in the past year That is what we want to get at.

Mr. Marsh.—Yes sir, I have made great progress in oil emulsion. The cars look better, wear better, and the varnish lasts better.

Mr. Copp.—As the matter comes up again under subject No. 9, I suggest we leave this subject now and take up something else.

President Bruning.—We will close on this question now, and before I take up the other question, I will give Mr. Brown the floor now. He has a matter that is very important that he wants to bring up at this morning's session.

THE OFFICIAL ORGAN.

Mr. Brown.—Mr. President and gentlemen, I presume you are all not aware that we now have no official organ. I was not aware of it until this morning when we came here, and I learn that the RAILROAD DIGEST has declined to be our official organ, in the future. Is that so, Mr. Copp.

Mr. Copp.—Well, practically so.

Mr. Brown.—And of course we are without an official organ. Every organization has something of the kind. I do not know but what we might possibly get along without it. It did prove to be very expensive last year. But *The Painters' Magazine* people have been kind enough to make a proposition and it was delegated to me to bring it before the meeting to see what you thought about it. A representative of *The Painters' Magazine* is here, and he will state to you under what terms and conditions they will become our official organ, should we choose to elect them such.

President Bruning.—Is Mr. Schnell in the room?

Mr. Schnell.—Yes sir.

President Bruning.—Gentlemen, this is Mr. Schnell, of *The Painter's Magazine.*

Mr. Schnell.—Mr. President and Gentlemen, I will say that if this association elects *The Painter's Magazine* their official organ, that we will do everything in our power to advance the interests of the association. Now if you wish me to go into the details of the proposition I will do so, but it seems to me that is largely a matter for negotiation and that it might be well to appoint a committee to confer with me and come to some terms. I do not think there is any obstacle at all so far as we are concerned. We do not propose to become your official organ as a money-making scheme at all. If you want me to go into the details, I will be glad to do it, or I will confer with a committee, as you prefer.

Mr. Brown.—Mr. President, I would say that it is understood that Mr. Schnell and his people are not desirous of crowding out anyone at all. It was at our solicitation and request that we had a talk. Mr. Copp and I, with Mr. Schnell, and to get his statement about the matter as to what they would be willing to do, and we submit it to the association to accept it or reject it, as you choose.

President Bruning.—Gentlemen, I think the proper way to bring this to a head, that is, to do it quickly and to get better results, would be to have someone make a motion to have a committee appointed to confer with Mr. Schnell, and give that committee power to act in the premises.

Mr. Brown.—I certainly think it would be better for the gentleman to state what he is willing to do; then we can vote whether we want a committee or not; let the members have something to vote on.

Mr. Schnell.—Well, gentlemen, if we become the official organ

of the association we will expect the support of the association in so far that the entire association will subscribe to the official oorgan. We in turn will publish a verbatim report of the proceedings of your convention, devote a certain number of pages to a railroad car-painting department, and give you as much space as we can. It is impossible to say just how much space we will give you; that will depend entirely upon the importance of the matter presented to us. We will, however, have at least one and maybe more articles on car and locomotive painting in each number, and we will also have gossip in reference to the association, and correspondence of general interest to the association from the members of the association. Our subscription price is $1.50 a year, and if the association subscribe in a body, we will make a special rate of $1.00; that is allowing you 33 1-3 per cent. off for the entire subscription. I understand it has been the custom of the official organ to see to the publication of your report in book form. If we are required to do that we will do it at cost to us. I do not know, but it seems to me that the cost would be between fifty and sixty cents a copy. I am not sure without going into the detail, but I believe that it is about what the cost will be. Concerning the cost of the stenographic report, we will be willing to pay one-half of the expense of the report. We will, as I say, publish the report verbatim, together with such photographs of your newly elected officers as we can get. I think that is the proposition in a nut-shell. I want to say further that *The Painter's Magazine* would not have made any advance to get the official organship had not the other paper withdrawn, for we, as Mr. Brown has properly stated, have not any desire to crowd anyone out, but if the association desires an official organ and elects us to that position, why, we will be glad to serve you to the best of our ability.

President Bruning.—I will ask our secretary, Mr. McKeon, to state whether those terms compare favorably with what we have heretofore had? The only thing I notice is the price of the magazine. We have been getting the RAILROAD DIGEST for fifty cents. The magazine is much superior.

Mr. McKeon.—The price of the magazine is pretty high. We have been getting the DIGEST for seventy-five cents; that was a dollar paper at the regular price. I think that part is all right. The DIGEST, then the *Car Journal*, agreed here in Buffalo eight years ago to take the stenographic report free of expense to the association, which it has always done, in consideration that we subscribe for the *Car Journal*, seventy-five cents a copy to all members. I think the better way to get at this will be to appoint a committee of five to confer with Mr. Schnell and report later for approval. We can get at the details in that way.

Mr. Hutchinson.—I believe it is right that we should entertain the proposition of Mr. Schnell, and I would make a motion that a committee be appointed to get that proposition exact and be able to present it at the next session of this convention.

President Bruning.—I would suggest that that committee be a committee of five and that they have power to act and then make their report to this convention, thus saving lots of time and trouble, subject, of course, to the approval of the convention also.

Mr. Hutchinson.—I will accept that.

Mr. Stroud.—I would also suggest that our Secretary be made a member of that committee.

The motion was duly seconded and carried.

President Bruning.—I will appoint on that committee Messrs. Brown, Copp, Hutchinson, McKeon and Dane.

We will now take up subject No. 3.

"Practical suggestions regarding interior decoration of passenger cars."

The first paper is by Mr. George Schumpp. If he is not in the room we will have the Secretary read the paper.

The The Secretary then read Mr. Schumpp's paper, as follows:

PAPER BY GEORGE SCHUMPP.

Without fear of contradiction, I may state that in no country in the world are the equipment and appointments to railroad travel equal to those in the United States. Our roadbeds and our rolling stock have become models for railroad builders the world over, and our passenger coaches, especially, cannot be surpassed anywhere.

The introduction of a passenger car with a longitudinal passage from end to end, with seats on each side, and admitting of the free passage of trainmen throughout a train, put us at once far in the lead of European railways and opened possibilities for the promotion of the comfort of the traveler which the old style compartment coaches never could have opened.

Our superb dining cars, our luxurious sleepers and buffet cars, our parlor and observation cars are acquisitions of such merit that foreign countries have been forced to adopt them, and their immense advantages are conceded on all sides.

With the advancement of car building, the art of the car decorator has become of supreme importance, and the air of elegance and refinement which pervades the modern American railroad coach and which gives to the traveler that indescribable feeling of ease and rest may be directly traced to his efforts.

The style of interior car decoration has undergone many changes, and, while none of them appeared to be radical, yet there is a vast difference between a new and an old-style car. In this, as in any other field, to stand still means to retrograde, and retrogression is one word that cannot be tolerated in the dictionary of an American railroad man.

There are running, on American railways, passenger coaches that for richness of carving and beauty of ornamentation could not well be improved upon, and which at the time of their construction were regarded as the very acme of perfection as far as interior decoration was concerned. The brush of the painter had little in the production of the exquisite "en semble" which these cars presented, and the wood carver may well be said to have every claim to praise and recognition where his skill came into question, and yet these cars have ceased to be models. Conditions have changed, and the change has come as a most natural one. Every improvement in car building, every step in car decorating resulted from efforts to give increased comfort to the thousands and hundreds of thousands of people who continuously come and go over the great steel thoroughfares of the North American continent.

It was recognized that the first requirement of comfort was cleanliness, and this rule once established worked a revolution in the methods of car decorating. In order to insure a thorough cleaning of a coach every nook and corner must be made easy of access to the person who does the cleaning, and care must be taken to avoid creating unnecessary nooks and corners. Too much stress cannot be laid on the importance of thorough car cleaning, for it constitutes a sanitary measure of imperative necessity in an enclosed space where day by day congregate numerous people, over whom a sanitary control is utterly impossible. The less ornament of carving presents the less chance for dust, dirt and disease germs to settle and accumulate; and trained railroad managers have been quick to realize this. As a result, less and less carved work is wanted in passenger coaches, and the tendency of the day is for broad, smooth surfaces and for as little paneling as possible.

The richly carved pilasters, once a delight and a joy, begin to disappear, and a plain column with a little carved work on the cap is now all that is wanted. The beautiful decorations in mantel top style that distinguished many a car may yet be seen, but not in lately constructed coaches.

All intricate panel work should be avoided. Metal ornamentation too is on the wane, and even the baskets have become plainer, but more practical at the same time. All this has created a wide field for the painter. The brush has become the chief medium for artistic decoration, and he has achieved notable triumphs in the invention of pleasing and restful designs, and the creation of harmonious color effects.

The traveling public is unconsciously impressed with a tasteful and artistic interior, and thousands are apt to praise the beauty of a car without being able to account for exactly what it is that caught their eyes. In most cases it is the painter's work that has struck the passenger's fancy. The woodwork of a car may be ever so fine, the color of the plush with which the seats are upholstered and the style and color of the blinds shading the windows may ever so well harmonize with the tint of the wood, still the car will present an empty and bare appearance until the painter has put the finishing touches on the interior. His skilled hand and fine taste for the blending of colors cause the bareness of panels to disappear.

It is the great traveling public that is to be pleased. The traveling passenger turns his eye (weary from gazing upon the too rapidly passing landscape) to rest, and his eye drinks in the beauty of the graceful designs upon the headlining, a tasteful border or a delicately shaded corner piece. The effort is both

pleasing and quieting. It is then that the painter may with satisfaction view his work, for he has succeeded in what he aimed to accomplish, and he has given his employer cause to be satisfied with his effort.

As a matter of course, the painter is restricted in his work by the extent of the head and side lining. The headlining panels should reach clear across the upper deck with two windows' length. The sidelining should be in keeping with the upper deck. The woods used for these are quartered oak, mahogany and maple. Of the three, oak is, in my judgment, the least desirable. It often happens that a car remains in service for a long period on some divisions outside of our main lines, and when, at last, it reaches the paint shop, it is found that the varnish has perished, that dust and smoke have entered the pores of the wood, and the resulting stains cannot be removed even by scraping. In such cases attempts at the restoration of the natural finish will prove vain. The only way out of this is to paint with a delicate tint and ornament with a neat border with corner pieces in harmonious colors, which will produce a pleasing effect.

In second and third-class coaches a flat scroll will, as a general thing, serve all purposes. In first-class coaches, however, a little shading will certainly not be amiss.

Where silver is used on an oak lining, outlining is almost a necessity. Darker colors may be used in corner pieces and bordering, which will have a good effect. Gold leaf also requires outlining when used on an oak lining. On mahogany lining gold leaf appears richest, but the deep color of the wood makes outlining unnecessary. No background affords the painter so many chances for handsome color effects as mahogany lining, and it is here that the finest and most exquisitely high lighted and shaded scrolls may be found.

In all cases the painter must, of course, be guided by the general effect produced by the car's interior. It is his work that must give harmony to the whole, and a study of new designs and new color effects should not be neglected, even by the master, whose taste is ripened by the experience of years of work.

In coaches of older type, where the panels are smaller and do not take in the whole width of the deck, stencil bordering is employed with excellent results, and the effect is often charming, provided the color selections have been appropriate.

Cars with a canvas lining offer the painter an especially wide field. This lining, with its ornamentation often tests the decorative ability to its full extent, for here he does not merely finish the decorative work, but the creation of the whole effect of the interior devolves upon him. As a rule a light tint is given, and flat scrolls appear preferable, though a good deal of shading is employed by some. Almost every color may be used, and the very brightest in a great many cases seem to be the best.

In all fields of human activity individuality should be encouraged, and in this respect our own field is no exception. It breeds new ideas, gives new thoughts, and tends to the general advancement of our calling. We take pride in the fact that today we lead the world, and that American railway coaches for solidity of construction and beauty of decoration are unsurpassed.

Let each and all of us strive that we retain for all time this position of honor.

President Bruning.—The next paper is by Mr. A. T. Winchell, of the American Car & Foundry Company, St. Charles. Mo. Is he in the room? The next paper is by Mr. Frank Taylor, late of Barney & Smith Mfg. Co., Dayton, O. Have you either of those papers, Mr. Secretary?

Acting-Secretary Cook.—No, Mr. President.

President Bruning.—This subject is now open for discussion, gentlemen. I would like to hear from some of you, Mr. Copp? Mr. Worral, we would be glad to hear from you on interior decoration?

Mr. Worral.—Mr. President, I had not thought much of this subject, and it seems to me that the paper just read covers the ground pretty well. In my estimation oak is really the least preferable of any of the three woods. Maple, bird's-eye maple, seems to hold the grain, seems to be more intact because there is no filling, there is no grain to fill; therefore, there is no filling to come out of the grain. Cloth linings are going out of date very fast. On our road all of the new cars that we build or rebuild have wood lining. The cloth lining is not worth while to consider, because it is almost out of date.

Mr. Copp.—Mr. President, I have not given this matter much thought. I will say that we are putting in wood headlinings, decorated with suitable stencil. Mr. Bailey has very tasteful work in his shop in that direction—wood headlinings. He gets up some very nice designs.

President Bruning.—Is there any other gentleman who wishes to have anything to say on this subject?

President Bruning.—Mr. Miller?

Mr. Miller.—I have nothing to say except that I agree with the preceding speakers in that I prefer to use mahogany and maple for headlinings.

President Bruning.—I am rather inclined the same way myself. Why couldn't we get that a little stronger, so that it would probably do some good when they buy new cars, and keep oak out of them?

Mr. Miller.—I am also greatly in favor of using just the ordinary poplar or whitewood and painting; it gives us more latitude in the use of colors, and I really think that the best lining that is put up in cars to-day is the painted headlining on poplar or whitewood; and if I am not out of order I would offer as a motion to this convention that it is the sense of this meeting that we are of the opinion and would encourage the use of poplar, mahogany and maple for use on headlinings and discourage the use of oak entirely.

Mr. Hutchinson.—I will second that motion.

Mr. Cook.—Mr. President, would it not be better for Mr. Miller to make that motion read that we discard or rather encourage discarding the use of oak for the interior decoration of the car. Does he mean simply the headlining?—because wherever the oak is we have the trouble.

Mr. Miller.—I would include that.

President Bruning.—Are you ready for the question? As many as are in favor of the motion say aye, contrary the same. The ayes have it. So ordered.

There is a gentleman here—it is probably a little out of order, but we had better give him a few minutes time. The programme says "Practical Suggestions Regarding Interior Decoration of Passenger Cars," and we are here to get all the information we possibly can, and this gentleman has some designs here. Do you think it would be proper to let him talk to us a little?

Mr. Gohen.—Certainly, Mr. President.

President Bruning.—If that is what we ought to have I think it should come up under this heading. If the gentleman will step forward we will give him a few moments of our time.

Mr. Frank Fechteler (of Palm, Fechteler & Co.)—Mr. President and Gentlemen: I take great pleasure in showing you samples of interior decoration. The question arose as to its durability, such as the matter of smoke affecting the hand painting. I think you all know that smoke will have a greater effect on hand work than on our process, which is all leaf, and flat. It does not present a surface that can so easily be rubbed off in cleaning the car, nor will it become affected by smoke. All the leaf used is aluminum leaf, and where you see it in gold it has a gold surface. It is being used by the Pullman people, and if they see fit to use it, I think others can also. The Pennsylvania people are negotiating with us now. I merely mention that to show you that it has gone through its experimental stages, and is now considered a success. As you see, so far as results from an artistic point of view are concerned, why, the hand cannot do what you see there (indicating). That is, you might say, an impossibility, irrespective of the artist or whatever he may attempt to do. The simple application of transfer ornaments, as all you gentlemen know, dates from way back; it is identically the same as you probably knew it forty years ago, when you used small ornaments on the sides of a buggy or omnibus. This thing is absolutely the same, only it has been carried out to an artistic and a practical success. A boy can put it on; it does not require an experienced painter, designer or artist. Furthermore, you have, for instance, a car here or a car there, and you wish to have the ornamentation the same, but in the locality you may not have a painter; you may have trouble with your painters; you have a superior class of painters in one shop than another. These, you know, are printed on paper, and can be sent to all parts of the country, and, further, you obtain uniformity of decoration. For instance, should that center piece be damaged, you have a duplicate of it which you simply transfer. Therefore, you will always have the uniformity which exists between the corner, the border piece and the center. This art is not new, but

it has been advanced, like everything else in car-building, to its present state of perfection.

President Bruning.—If there are no further remarks on this subject, a motion will be in order to—

Mr. Fitch.—I came in just as the motion was adopted, partially in condemnation of oak as interior finishing. While it may be all right for this association to go against that method of finishing, considering the immense amount of oak we use, not only for interior decoration of cars but for furniture, for this association to go against that class of wood I cannot see the—

President Bruning.—It is merely the sense of this convention, Mr. Fitch. There is nothing wrong about it.

Mr. Miller.—When I made that motion it was with reference to headlinings. The preceding talk had been on headlinings.

President Bruning.—Let it stand as it is. It is a good thing anyway.

Mr. Fitch.—Mr. President, I fail to see it. I wish to be registered as against the proposition, considering the immense amount of oak that is being used for that purpose now. It strikes me the only objection that there could be against it at all would be on headlinings.

President Bruning.—Mr. Fitch, probably you are not aware of it, but it is a fact nevertheless, that you can almost finish the interior of a car now with this cheap grade of mahogany; some of it is called baywood; it is not California redwood; it is a different species of wood; but you can almost finish the interior of a car with that just as cheaply as you can with oak. Oak is getting to be a scarce article in this country, and that is the reason we are getting such an inferior class of oak in our cars. Oak is getting to be very scarce, very high priced.

Mr. Fitch.—It is being used more than ever for furniture.

President Bruning. In our section of the country it is a very scarce article.

(On motion, duly seconded, the convention adjourned until 9 o'clock Thursday morning).

Third Day's Proceedings

SEPTEMBER 12, 1901—THURSDAY.

President Bruning.—The convention will please come to order. We will have the Secretary pro tem. read Secretary McKeon's report.

Acting Secretary Cook then read the report, as follows:

SECRETARY'S REPORT.

Sept. 6, 1901.

I present you to-day the thirty-second annual report of the association. The convention held at Detroit last year was largely attended, and one of the most successful meetings we have had. According to the by-laws we have been obliged to drop eleven members from the roll who were over two years in arrears for dues; 23 new members have been enrolled since last report, which gives a membership up to September 1 of 191 active members, 22 associate and 6 honorary; total 219, a gain of 12 over last year. Our subscriptions to the Railroad Digest the past year were 146 copies, which have been mailed to all active members of the association whose dues were paid up in full at the beginning of the year.

The Advisory Board met in Cincinnati February 22, and prepared a list of subjects for this convention. The usual report of the proceedings of the last convention was published and sent to all members. We are sorry to report a deficiency in the treasury this year, which is caused by our expenses being heavier than usual.

The receipts of the treasury for the year have been:

Balance from last year	$108.43
Fees and dues	601.56
Miscellaneous receipts	5.25
Total receipts	$715.24

DISBURSEMENTS.

Sept. 8, express on banner to Detroit and return	$1.42
Sept. 14, telegram of greeting to road foreman of engines	.40
Sept. 14, reporting opening of proceedings of convention.	3.00
Sept. 24, Gov. J. B. Sayre for relief of Galveston sufferers	100.00
Oct. 8, printing letter heads and envelopes	3.00
Nov. 11, subscription to 146 copies R. R. Car Journal at 75 cents	109.50
Nov. 26, freight and drayage on reports of proceedings.	2.24
Dec. 4, printing and furnishing envelopes for reports.	3.00
Dec. 6, printing 250 reports of annual meeting	215.85
Feb. 22, expenses of Advisory Committee at Cincinnati—Robert McKeon, $7.50; T. J. Rodabaugh, 6.05; John F. Lanfersick, $5.25; Frank Taylor, $4.50; J. G. Keil, $7.50; B. E. Miller, $29.75; total	60.55
April 6, envelopes and printing	2.00
Aug. 1, printing circulars	7.00
Aug. 1, envelopes	1.75
Postage	53.53
Secretary's salary	200.00
Total	$763.24
Amount due secretary	48.00

Respectfully submitted,

ROBERT MCKEON,
Secretary-Treasurer.

President Bruning.—Gentlemen, you have heard the report of the Secretary-Treasurer. What will you do with it?

Mr. Gohen.—I move it be accepted and made a part of the records.

Seconded and carried.

President Bruning.—We will now take up Subject No. 4. Is Mr. Truman in the house?

Mr. Truman.—Mr. President, I am in the house, but I would rather have the Secretary read that paper.

President Bruning.—We will now have the Secretary read Mr. Truman's paper on the subject:

"Is it practical and to the interest of the railroad companies to adopt a piece-price for all classes of painting repairs in the car paint-shop without employing a certain percentage of day men?"

Acting Secretary Cook then read the following paper by Mr. Truman:

PAPER BY W. H. TRUMAN.

As I have had practically no experience with the piece work system, especially as foreman, you could not expect to receive a very intelligent reply to the above query; and I imagine, by the time I am through, you will conclude that I am somewhat like the doctor who was called in to treat a case which he could not diagnose; the doctor declared he was good on fits, so he would throw the patient into fits and then cure him.

In all modern railroad car paint shops there is much work to be done which does not come directly under the head of "Railway Equipment," such as general ticket office, station signs, railroad crossings, bridge signs, etc.; especially is this true with the railroads in the South, for by a law, enacted in most of the Southern States, railroad companies are compelled to put up signs at every road crossing, forbidding trespassing on their property, etc. This sign board alone contains upwards of one hundred letters. They must also have sign boards wherever the railroad crosses a State line, again they have a sign on either end of all bridges, crossing creeks, rivers, etc., giving name of said stream. We have at least forty-five different kinds of signs of this class on our road. Besides these signs there are numerous other small jobs continually coming in to the railroad car paint shop along with the running repairs to coaches, etc., so that it appears to me to be next to impossible to adopt a piece price for all classes of painting repairs. While I am aware of the fact that railroad signs do not come under the head of "Painting Repairs," I do know that it would be a difficult task to adopt a piece price for this class of work as well as the different kinds of repairs with which we have to contend. Hence it would seem almost absolutely necessary to employ a certain percentage of day men, unless you had upwards of twenty painters, with two or more apprentices, in which case you could have an advanced apprentice to do this extra or repair work, for as a rule I believe we do not confine the apprentice to piece work, but in shops where a small number of men are employed I would consider it practicable to have a certain percentage of day men.

President Bruning.—Gentlemen, I believe this is the only paper we have on this subject. We would like to hear from some of the members who are doing piece work. We want to hear both sides of this question.

Mr. Rodabaugh.—Mr. President, in order to bring the subject before the meeting, I would like to make a few remarks. The writer of the paper speaks of the various sizes and different kinds of letters necessary for railroad stations, etc. I do not

see any trouble in that. I think that can all be done by piece work. At least I so do it all. There is not a size of letter, from a half inch up to twenty-two inches but what I have a piece work price per letter; and, according to the size of the sign or board, a piece work price for getting that board ready for the lettering, so that I do not see any reason why it could not be done piece work. In regard to the percentage of day men in the shops, you need have but one really; that is, I mean in each department; and that is a sweeper, a man who takes care of the shop, carries water, and so on; that is the only man who needs to be day's work; all the rest can be done piece work. If you have a barrel to roll out of the shop it can be made piece work, or if you have one to roll in the shop, it can be made piece work: If you want to empty an oil barrel, varnish or any kind of paint, you can have that piece work. You can have a price for fetching material into the shop, such as for fetching a box of glass into the shop and putting it into a rack. In fact, there is not anything on a railroad but what can be made piece work successfully, and with a good deal of pleasure to the men that are working in it. I do not suppose there is a man working piece work under the Pennsylvania system but what is making more money at piece work prices than he could make at day work. In my opinion there is not a thing on a railroad, from a car wheel to a locomotive or any miscellaneous work that may come into a paint shop, but what can be made piece work. In fact I do not know of anything on the Northwest Division but what is piece work, and I do a great deal of the Northwest Division work, such as mile posts and whistling posts, fence posts and all things of that kind—it is all piece work, every bit of it. I havent a job around a railroad shop at Fort Wayne but what is piece work. I have no day men except the sweepers in the shop.

Mr. Canan.—I want to verify, Mr. President, what Mr. Rodabaugh has said, especially in regard to the sign work. We have all of that to do, and we have three or four hundred crossing signs alone on the division that I am on, beside a great many others; and, until this summer they had all been done by the day, but this year we have adopted a price per letter for all classes of letters, as Mr. Rodabaugh has said. There is a large number of stations that have large gold signs, with the mileage on each end, and this year they have adopted a sign for each station, giving the name alone, a four-inch letter on one of the divisions and a five-inch letter on the other, and we have adopted a price for each letter, and this is not only satisfactory to the company, but it certainly is very satisfactory to the men. We get just as good work, and the men make three times at piece work what they did at day work.

Mr. Gohen.—Mr. President, I would like to ask Mr. Canan if it was not a slip of the tongue when he said the men made three times as much at piece work as they did at day work?

Mr. Canan.—Well, possibly, I will modify that and say twice as much.

Mr. Gohen.—I think we should carefully confine ourselves to the truth in these figures, because some person may misunderstand our quotations, and we may be put in the wrong. We have never been working piece work on our road, although I have thought of it, and I have talked with our Superintendent of Motive Power several times about the possibility of adopting it. He said if I thought it was advisable, why, we would go into it; but it seems to me that there must be an interminable lot of bookkeeping to be done in this piece-work system. If you have men working by the day you probably put them on one or two jobs, they may work day in and day out on them, and of course if it would follow that way in piece work it wouldn't amount to much; but if you kept changing men off all the time it would seem that you would have an awful lot of clerical work in your paint shop. Now, the question with me is, would it pay the company to put on this additional help in the clerical department?

Mr. Nicoll.—Mr. Canan said the men made twice as much under the piece-work system as they did by the day. Our men make 25 to 26 cents, some of them higher; whereas they used to make 20, 21 and 22 cents an hour. We work piece work altogether—furniture, even to a joint strip on a car, everything that is done in our shop is done under the piece-work system, and we find we get it done quicker, and get it done for less money than we could under the day's work system.

Mr. Canan.—What I said referred to the matter of sign work. I am not speaking of the other work at all, although that is very satisfactory. But in this matter of signs the man that does the lettering makes as much more as he did in day work, and he does not slight the work; he does just as good work; but why I say it is satisfactory, he will do as much more and not work very much harder than he did at day work. So the work is run out quicker, and is much more satisfactory to the company and to the men.

Mr. Brown.—I have in my mind, and I am confident, too, that men can, if they are allowed, make more, and when the chance is offered for them to try and make more they will undoubtedly do it; but after a very short time there is a reduction made in the price per letter, etc., and so far as I have been able to learn, they are not allowed to make over and above a certain amount of wages, a fair day's wages, and by and bye they will have to work like the old harry to make that.

Mr. Weis.—I do not find it difficult, Mr. President, to make a piece price for anything but touching up a car for revarnishing. I tried that for one year, and I found that I misjudged my own work. I figured striping by the foot and touching up, and did it successfully according to the amount of money the men earned.

Mr. Long.—I have been doing the piece-work system, Mr. President, very successfully, a number of years, and we consider that it is the best system of handling the work. Our company considers that the difference in the output would make more than the difference in the clerical work. Of course, it takes a little more clerical work. We have a schedule of prices for everything from the bottom up, with only one exception, and that is for puttying old cars and touching up; but I have a blanket price for that, and I look that over personally and set a price for that, for the men, before they start on it, and I found that is about the only way that I could ever make it come out right. My men make all the way from 10 to 12 per cent. more than they did by day work. They are well satisfied, and I do not think I have got a man that would be willing to change to day work again.

Mr. Gowe.—Mr. President, my exception has been the same as that of Mr. Long about piece work—having an old car to reputty and touch up. Men formerly getting 21 cents an hour will average about 26, and the stripers formerly getting 22 average about 28 or 29 cents. There is not one of them who wants to go back to day work.

Mr. Dane.—I would like to ask, Mr. President, if the piece-work system does not require an inspector of work?

Mr. Gowe.—Where they have quite a number of painters it does. Each gang has a foreman.

Mr. Dane.—I think Mr. Little has inspectors in his work.

Mr. Little.—They work the piece-price system altogether in the Pennsylvania shops at Altoona. It has proved an entire success there. I cannot say that we have ever found any fault with it at all, from the very start. Of course, it has been improved on from time to time. And I think Mr. Ball has prices set for touching-up cars. I have a price for touching-up tenders and cabs, but I have very little of that class of work to do. Like Mr. Long, I have a blanket price, which has to be adjusted according to the conditions of the work and according to the amount of striping that you find necessary to do. Mr. Gohen stated it required considerable extra clerical work; I believe it does. We use a card system entirely, by which everything is put on the card, and you get the exact average hours on each job. You know just exactly what a job costs, and we find no difficulty at all in our work.

Mr. Gohen.—Mr. President, at the risk of being called down again for talking too much, I want to say that some two years ago we talked very strongly about adopting this piece-work system on our road, and I had Mr. Becker keep a record for some time of the average cost of doing the work in his shop, showing how much it cost to clean the outside of a 50-foot car, the inside of a 50-foot car, 60-foot car, and so on—all the operations down the line. Mr. Garstang then wrote to a number of roads and got their piece-work prices for painting cars. When I began to figure up the piece-work prices that are paid by the railroad companies to-day and compared them with the prices that we were actually paying on the day-wage system in our shop, I want to say to you that the day's work beats the piece work. I believe it is a nice thing for the foreman to have a piece-work plan; I believe it is a nice thing for the workmen, but if you have a thorough-going, up-to-date foreman, who will not allow his men to take ten hours to varnish a car, I will tell you that it

will not cost your company any more under the day's work system than by piece work. While the men will make more money, it is true, and I presume it is satisfactory to them, but it is just as some one said, they won't allow the men to make too much money, and when they do begin to make that amount, why, the company begins to cut down the piece price. If it does not cost the companies any more money to do the work than it used to under the day-wage system, and the men can make more money by working piece price—which they naturally could because they would be working harder by working for themselves—it would be all right to introduce the piece-price system. But so far as I can see, under the operations in our shops, our company certainly would not make anything by adopting the piece-price system. Perhaps the men might like it, they might make more money, and I believe it would be a good thing for them—

Mr. Little.—Do more work, too.

Mr. Gohen.—Yes, they would do more work; that is right. My strong reason for not being an advocate of the piece-price system is that I am afraid it is too complex.

Mr. Butts.—We are running our shop on the piece-price system, and we have gone into the question very thoroughly. I would like to answer Mr. Gohen, talking about the price. I think if you have got a thorough, up-to-date foreman in the shop, he ought to know the average cost of doing a car. Our cars are put out under a classification. We know what a class "A," class "B," or a class "C" car ought to cost. Now, the average price of those cars for years past under the day's work system was taken for our basis; we then made our prices come within that limit, and reduced it fully one-third, and made our schedule of piece prices. We are not paying as much as we did before; that is one sure thing, and I do not believe there is a man in the shop that would like to go back to the day work plan. The advantages we get are these: Our output has been largely increased, and the number of men employed, I admit, is less; but they are a far better class of men, more expert; you naturally get into your shop experts, and in order to get experts in the shop on the piece-work system, I think we ought to have just such men as Mr. Gohen to stand up here before his Superintendent of Motive Power and say, "Here! if you want me to make a success of the piece-price system you must not limit the amount that a man shall make." That is where the trouble comes in piece-price work, and I think that we ought to do that; we ought to show our superiors that they shall not limit a man. I claim that an expert is worth more than a man who is not an expert, in anything, in any shop; and, in order to give that expert encouragement, you must not limit the amount that he can make, as long as the price is reasonable. I have had an understanding with our Superintendent of Motive Power that it does not make any difference what a man earns; he does not criticize the amount; we do not care if a man makes $150 a month if he once got 20 cents an hour; it makes no difference to the company; and we do not limit them in the shop. I took that matter up and illustrated it the best I could, and showed to our Superintendent of Motive Power just what I expected to gain by putting in a piece-price system, but I said "We will never be able to accomplish this if we go to work and cut the prices of those men the moment they begin to make a little more money. If that is done in the shop where I am I should not advocate piece work, at least altogether piece work. There are some things that you have, roughly speaking, to give and take. For touching-up a car, we have a blanket price; perhaps on one car they won't make their rate; perhaps on another car they would double it. The same way in washing a car; when we get an easy car to wash we pay just as much for it as if it was hard, but the average is good. Take the matter of graining sash, for instance. For a double sash car it used to take about seven to eight hours to grain a set of sash; we put in the roller process, and got two young men and gave them one cent each for graining sash, and they have made sometimes as high as $90 a month, and they are but 23 years old. I wish they could make $100.

Mr. Hartshorn.—How long will they make it after the company finds out they are making so much?

Mr. Butts.—We don't care. That is what I am contending for. I think the company ought to adopt a piece-price system without a limit. With a limit you are laboring under difficulty. Remove that limit, and you are all right. Your men will like it, and everybody will like it. Your company will get the work done for less money, and you will get better work and more of it. It is getting to be a great problem in these large shops of getting the equipment through the shop in a given length of time.

Mr. Truman.—Mr. President, I did not understand that we were to discuss the advisability of working the piece-price system or working day work, under this head. I thought it had reference only to the touch-up or repair shops. So far as the piece price is concerned in railroad shops, I have, as I stated in the paper, had practically no experience as foreman painter, but I have worked piece-work system, and in regard to limiting the price, they do that right here in the City of Buffalo. I worked here for Frank King, and two of us decorated, striped and lettered cars for $18.00 at the Erie shops. They have cut them down from $18.00 to $10.50, and they would allow five men to do only one car in a day, making $2.10 per man. That is all they would allow them to do at that time. That is four years ago. As I stated, I did not know that we were going to discuss whether it was practical for the railroads to adopt a piece-price for all classes of work. I thought it was simply the car repair work.

President Bruning.—The question says, "All classes of painting repairs."

Mr. Lanfersiek.—I heartily agree with everything that Mr. Butts has said in the matter of piece work, though I think that he was digressing from the subject somewhat. I believe the actual question is whether piece work can be done in all its branches in a railroad shop without any day work.

President Bruning.—That was my understanding when the Advisory Committee got up this subject; that that was what they were trying to get at; for all classes of painting repairs in a car paint shop—without employing a certain percentage of day men. We have been off the subject altogether.

Mr. Lanfersiek.—We were simply discussing the matter whether piece work was better than day work, which is not the question; but I want to say this: There are a great many railroad shops working piece work in the United States to-day, and probably some in Canada, and if it was possible to do all the work at piece work, those shops that are working day's work would do it all piece work, and for the very reason that they do not do it all at piece work, I am one of those that believe it cannot be done. So far as the work is concerned in regard to passenger cars, inside and out and everything about them, it can be done piece work; cars and engines can be painted; but a great many things about the shop cannot be done. I won't say they cannot be done; a man will misjudge his price in five or six cases out of ten; he does not like to do that; he likes to get the work in hand, so that when he sets his price he can get there. But I believe the very reason that all the people are not working piece work in piece-work shops is the reason it cannot be done.

Mr. Bailey.—I never had any of this piece work, but I am seeking a little information, and I want to ask some member who has had both the day and piece work a question. We work in our busy time forty men on passenger business; we put out from 44 to 52 cars a month. I want to know if those men who have had both the day and piece-work systems turn out more work by the piece-work system than they do the day-work system? I would like to have some one tell me the difference in his shop between the day-work and piece-work systems. I would like to know if it is of any advantage to the company.

Mr. Butts.—I am willing to answer Mr. Bailey; I am very glad to do so. I shall have to generalize a little. I have not the facts and figures, and I will have to do it from memory. We reduced our force from an average of 210 men at day work to 185 under the piece-work system.

Mr. Bailey.—What was the difference in the output?

Mr. Butts.—I think the difference in the output was about somewhere from 15 to 20 cars a month in favor of the piece work. It varied with the class of work.

President Bruning.—I would like to hear from Mr. Gerhart in regard to touching-up on the piece-price system?

Mr. Gerhart.—I have worked piece work for at least 17 or 18 years! I know exactly the difference between a piece-work and a day-work shop. Our men would sooner go home than do day work, but we have to have some few men on day work all the time.

President Bruning.—That is what we want to get at; whether it would be practicable to run a shop without employing a certain number of day men?

Mr. Gerhart.—I would say no. In our shop we have to have some few day workers on account of doing so many kinds of work. So far as the output of the shop is concerned, I know we are doing over one-third more than we did when we were doing day work.

Mr. Fitch.—I would like to ask the gentleman the average wages the men make at piece work over day work in his shop?

Mr. Rodabaugh.—My friend Lanfersiek and one or two others say it can't be done. I do not believe that word is in the dictionary. I say it can be done. There is not any class of work that comes into a railroad paint shop but what can be done by the piece and done successfully, and I can prove it.

Mr. Weis.—I would like to hear from Mr. Gerhart, how he overcomes the touching-up in that class of work?

Mr. Gerhart.—We have a price for touching-up a car. It does not matter what amount of touching-up is on that car. They have got to take the good with the bad. So on one car they may lose a little, but on another car they will make up. Taking the average for the month, they are very well satisfied with it.

Mr. Gehman.—Mr. President, in order to avoid quoting the dictionary, I will say it cannot be done. I think it is utterly impracticable because there are so many small items that come in the shop that you have to employ either all day men or piece work men. There is a great deal of work coming in from the road, and it has to be done by day work, and, as the gentleman said, they have to take the good with the bad. If you make it that way, why some men may be away when the bad work is done, and in when the good work is done, and so there will be jealousy and rivalry continually. I have been in a shop where the men worked by contract, and they wanted it abolished simply because of jealousy; but, as I was going to say, in regard to the fact that it cannot be done, the reason is because so many different classes of cars come in the shop; some cars are full of holes and cracks, and others need very little puttying. What are you going to do about the price of puttying or touching-up?

Mr. Miller.—I have done a great deal of piece work for the last ten or fifteen years, and have had men under me working piece work. I claim that it cannot be done to the exclusion of all day work. It can be done in this way: You can go along and make prices as the different jobs turn up, or you can let men go ahead and finish up a job and give them a price afterwards, and put it in as piece work, but I do not call that working piece work in the literal sense of the word. I once asked a master painter, who I believe is a member of this association, if he was working piece work. "Yes, sir," he said, "piece work altogether, not a bit of day work" Says I, "What is that?" He says, "Not a bit of day work." "Why," he says, "I even have the man behind my stock room bench working piece work—give him so much for cleaning a pot." Of course I did not believe it; I paid no attention to anything he said after that, simply because I knew the man was not telling the truth. But there are a great many shops where piece work can be done successfully with a certain portion of day work. At present at the Scranton shops and at Dover I am doing all striping, ornamenting, coating, varnishing, painting of decks, trucks, roofs, and jobs of that kind; but when a little patch of headlining comes up to be done, why, we have to make a price to fit the job or do it by day work. We have to have our sweeper, stock room men and the like—

President Bruning.—You know we had a man here who swept his shop by the piece?

Mr. Miller.—So much a stroke of the broom, I suppose? (Laughter). And by working piece work and day work together we can get along. I work about half and half. The best class of work can nearly all be done piece work. The high-priced men can nearly all be worked piece work; then again, all the washing can be done piece work. Occasionally a car will come in, such as a private car, that you want to treat a little bit out of the run of ordinary cars, and you specify what you want done to that car, and make another price, give a little more money or have it done day work, and if you do not want the day work to appear among the piece work, why, just take that day work, and put it down on a piece work slip and let it go in as piece work; that is done very extensively. But I am of the opinion that in a railroad repair shop piece work cannot be worked to the exclusion of all day work.

Mr. Schumpp.—We do not do piece work in our shops at all. It is all day work. One of our divisions has piece work. They do the sweeping by piece work; they give a man so much to sweep out the shop, so much to sweep out a car. In freight work they pay so much per lineal foot, as I understand it. It is the only division that has piece work on our system; all the others are worked by day work. There are some things, such as striping a coach, we do a good deal cheaper by day work than by piece work, and there are several articles that they pay more for in piece work than we do. He beats me on some things, such as rubbing a car, but he can't beat me lettering or striping a car.

President Bruning.—He pays a little more for varnishing than we do, too, does he not?

Mr. Schumpp.—He pays more for varnishing. I got mine done forty cents cheaper by the day on each car.

Mr. Miller.—I would like to ask some of these members who work piece work exclusively how they get around the patching of freight work by piece work—a board here and a letter there, etc., how is it done?

Mr. Lanfersiek.—I will say for the benefit of Mr. Miller that we pay so much per foot for the side of a car.

Mr. Miller.—You would want a timekeeper to go right behind him and follow him up, would you not?

Mr. Lanfersiek.—Well, that may be too. I am like you; I do not believe every bit of the work can be done, to the exclusion of day work, but I do say this: everything connected with a passenger car, everything connected with an engine, and everything connected with a freight car can be done piece work. I have done it for years. Every job that a man does, if it only costs a cent—and we have some things as low as a cent, and some as low as half a cent—must be shown on his card the next morning, or he does not get paid for it. It must be correct, too, because in the course of five or six months the Auditor comes around and audits those cards. If they are not correct the foreman must suffer, and he is not going to suffer because he looks over the cards in the morning when the cards come in. All those things can be done piece work. But I want to say this, for the information of any gentleman in the room here who desires to do piece work, it is a very easy matter if you will just put your head to it. For instance, it costs you a certain amount of money to varnish a car at day work. I don't care how long it takes the men to do the day work. It costs you a certain amount of money, say $1.50, 60 cents, 70 cents, 80 cent, $2.00, whatever the price may be. Divide that car up into a certain number of portions, and divide your $1.50 with those portions, and you will get what each portion will cost. That is a very simple matter. Carry that idea throughout all your piece work, and you will arrive at a knowledge of the piece work system. When the month rolls around you will have more work done. That is admitted by all men who work piece work. I find it so in my shop. A gentleman made a statement a while ago that it took two men all day to varnish a car. Of course, in shops like that, piece work would be an advantage. When men first start piece work they think, "If we do that work too soon they will cut us down," but when they see the thing rolls around year after year without a cut, they will say, when they go into the shop in the morning, "We will make three dollars to-day or three and a quarter." In a piece-work shop you will not see any loafing.

Mr. Fitch.—I wish to say, gentlemen, that on the Pacific system we are working piece work, not altogether, in the car department, but to a large extent; and we are doing it successfully, to the advantage of the company and the men. I cannot put any piece price into operation until I show the day cost, and my contract rate has got to be approved by the Master Car Builder and by the Superintendent of Motive Power and Machinery. We are doing all of our cleaning, varnishing and all straight work by piece work, and we are also now touching-up our cars. I have just made a new arrangement, for touching-up cars, and I think it is going to work successfully. We grade the cars. It is done something like this: We have a rate for cleaning a car off, digging out the corners, the loose paint, and such as that, and touching it up with lead. We have four grades for that class of work. Then we give a man so much for puttying it and cutting it down ready to touch up, and then we give him so much for touching-up the car, and we give him so much for touching-up the striping. We have, as I say, four grades for that, and then we have four grades for the touching-up of the striping, and it is working successfully. So far as the puttying is concerned, we have four or five grades for puttying cars, and

it works all right. We have had to show the day cost of all this; I got my information, to start this with, from Mr. Ball, of the Pennsylvania Railroad, and I am very sorry he is not here to-day! We give a man so much for sandpapering the old color off the car, and then he gets so much for giving it a coat of paint and puttying and all that. We put that on one card, clear up to the two coats of color; if the puttying is a little bit low he has a chance to make it up on something else. We give a man an old car, and a gang gets that car ready to stripe, on one card. There may be two or three or four men working on the car and at different rates of wages. Our rates are high out on the coast—much higher than yours. One man may get more, another less. There is a reason why those men should get those different rates; one man has learned his trade more thoroughly than the other probably. Then those men with the different rates pro-rate. If they make ten per cent. over their wages, the man who gets 25 cents an hour will get ten per cent. on twenty-five cents; a man who gets thirty will get a pro-rate on that; and if we put a striper or varnisher on a car, that striper gets ten per cent. of his rate on his wages, whatever he gets, so much an hour. I claim that if a man learns his trade thoroughly, a man that can stripe and varnish and do everything, he is entitled to more consideration than a man who can only do one one or two branches. For that reason I believe in pro-rating. As for doing all of our work by contract, we cannot do that; things are coming in continually that we have no rate for, and I cannot do anything by contract unless it is approved, as I stated, but we are adding all the time to our list of contract work, and it is working successfully. We are cleaning our cars a great deal cheaper than we ever did, and we are varnishing them cheaper. Our freight car work is nearly all done by contract. I certainly believe piece work is all right. So far as clerical work or an extra foreman is concerned, I would rather inspect a car when it is done than dodge around a shop and see whether a man is working or not, as we have sometimes to do in day work. I certainly believe in piece work, but I do not believe it is practicable to do it all by piece work: I think that a larger amount of work can be done by piece work and done successfully for the men and for the company. I think there are sometimes unfair things done toward the men in the matter of percentage that men are making over their every-day rates. If you have got a hurried job and a man works hard, he will make a large percentage over his wages for a short time. A man might work half a day very fast, but he couldn't work a month continually like that. One can run a few rods fast, but he cant run twenty miles that rate. Sometimes those rates are cited against a man. They say, if a man makes so much an hour for two or three hours he can do it all the time. I know that thing comes up, and we have to fight it. For that reason men who are required to pitch in sometimes and help out on contract would be willing to do it if they were sure they would not be cut down. I have in my mind one place where they are allowed to do that; they go as high as thirty or thirty-five per cent. over the wages. I thing that is right in certain cases, but I think it is too much on an average. But if men understood that they could in hurried times rush in, hurry up work and get it done faster, with the understanding that that should not be cited against them for their continuous work, I think that would be a good thing. We have to fight that sometimes on our road.

President Bruning.—Now, is there any gentleman in the hall that has not spoken on this subject? I would like to hear from every one, but I want to give these younger members a chance. I do not want to be arbitrary, but I want everybody to have a chance to say something on this subject.

Mr. Russell.—Mr. Fitch says if he puts a striper and a varnisher on a car that he divides the piece price according to the wages that the men get. Now, when he sets the price for varnishing a car (we will say his varnishers get $2 a day), he bases the price on $2 a day; then he puts a striper with that man, who gets $2.50 a day to varnish that car; he pays that man at the rate of $2.50 out of the piece price for varnishing that car, and the other poor fellow has to lose money on it.

Mr. Fitch.—That is an extreme case. We do not do that very often, only where it is absolutely necessary. If we put stripers in with these other men it may be because they have not got striping, and that class of work to do. If those men make their wages with the percentage added, they are satisfied. For instance, we will suppose they make thirty cents an hour, and they work so that the 30-cent man makes 32 1-2 cents, and the other man who gets nearly that makes his wages, he is satisfied if he gets his wages.

President Bruning.—Mr. Fitch, would it not be a better idea to let this varnisher varnish this car by himself?

Mr. Fitch.—Well, as I stated, we do that. Stripers and varnishers we very seldom use together, but a lower class of men, men who get from 20 cents up, we put together very often. We sometimes work apprentice boys in that same way, and it is understood in our shop that if an apprentice boy works with a journeyman that that man is expected to make a little more wages than he ordinarily would. Apprentices are not taken by any railroad company for the money they make on the apprentices. It is simply to make mechanics, so that they will have a supply when we are gone. For that reason you might keep an apprentice boy at work and not allow him to make anything at contract work at all; but if an apprentice works with and makes as much as a journeyman, which he will do sometimes at rough painting, and the journeyman shows the boy, our people are willing that the journeyman should make extra wages and profit by what the boy does.

Mr. Butts.—Mr. Miller, I believe, according to his statement, he can do all the work in his shop if he really wanted to on a piece-price system, except perhaps 2 1-2 per cent.

Mr. Miller.—I didn't use those figures.

Mr. Butts.—No, sir. I say I presume you could.

Mr. Miller.—I wouldn't go as low as that.

Mr. Butts.—The little piece of headlining and the board on the car wouldn't amount to over 2 1-2 per cent. of the sum total of all his work, generally speaking. We have got a good deal of information out of this discussion, but if we are held literally to this question we are discussing the matter of whether it can be done altogether in a paint shop. I think it is the opinion of those who have spoken here that all but a very small percentage of that work can be done, and it is so very small it is unimportant.

Mr. Gohen.—Mr. President, I just want to say a word or two. When Mr. Butts first got the floor he spoke about keeping a strict account; they were better able to keep a strict account of the cost of their cars under the piece price system than under the day wage system. I do not think that is quite the fact. I think you can get the cost of every car that you turn out just as true and exact under one as you can under the other. I was eight years with the Chesapeake & Ohio, and I have been about the same number of years with the Big Four Railroad. I could give you the cost, I guess, of any individual car that was painted on the Chesapeake & Ohio Railroad while I was there. I have on file in Indianapolis the cost of every car that has been painted on the Big Four Railroad since I went there; and if you do that you will keep in touch with your work, you will know what it is costing you, and then when you are up against piece price or anything else you will be in a position to talk intelligently on the subject. Every one of you ought to know just exactly what it costs you to paint every car that you do.

Mr. Dane.—I move this subject be closed and Subject No. 5 be taken up.

Mr. Miller.—Don't you want to take some action?

Mr. Dane.—I move that it is the sense of the convention that it is not practicable to work piece work to the exclusion of all day work.

President Bruning.—Gentlemen, it has been moved and seconded that it is not practicable and to the interest of the railroad companies to adopt a piece price for all classes of painting repairs in the car paint shop without employing a certain percentage of day men. Are you ready for the question?

(The motion was carried).

President Bruning.—We will now take up Subject No. 5.

"The relations which should exist between the railway company's purchasing powers and the master painter."

Mr. Gohen then read his paper as follows:

PAPER BY J. A. GOHEN.

In a word I should say, Mr. President, my ideal of these relations would be that of a happy, prosperous and contented married couple, free from prejudice, free from distrust, free from contention, each working with an eye single to the comfort and welfare of themselves and the company they represent. If the opposite prevails, and strife, distrust or contempt creep in, a

separation, or you might say a divorce, would probably be the only reasonable course to pursue.

The Master Painter, as a general proposition, believes he is the most abused man in the whole "shooting match," not only as to the purchase of material, but in every other respect; and it is a curious fact that very often the more capable, efficient and self assertive he is the more he feels that he is aggrieved, for he is more sensitive, and has more of what Mr. Chamberlain designated as "painter's prejudice" when he so kindly spoke to us at Detroit last year; and yet, I take it, this kind of man has pleasanter relations with the purchasing power than the inefficient, incapable man with "chocolate eclaire" backbone, who will go in day after day and month after month using anything and everything that is furnished, without protest and without enlightening his people as to the quality of the material furnished. This latter is the type of man that usually lays all the blame on the purchasing agent or his immediate superior. He will tell you the only thing the purchasing agent knows is the difference between one-half and three-quarters of a cent, or that the Superintendent of Motive Power, Master Car Builder or some one else is prejudiced in favor of Jones' Everlasting Paint, or Smith's Indestructible Varnish, which, in his private opinion, are no good. A divorce in such a case would be good for the company, and the Purchasing Agent would be the innocent party.

The Purchasing Agent usually is a man selected on account of his ability, acumen and probity. The management necessarily has faith in his honesty and integrity, or they would not appoint him. But he is human, and consequently is not omniscient, therefore he must depend upon the authority that creates the requisitions for such information as will enable him to purchase suitable material. That authority, in the matter of paint and varnish, is the Superintendent of Motive Power, Master Mechanic or Master Car Builder. Now these, like the Purchasing Agent, do not know it all either, so they depend upon whom? Naturally they should depend on their Master Painter, and they do almost invariably when they have confidence in their Master Painter's ability and integrity. If that is lacking they naturally turn to the supply man, who is uniformly a bright, shrewd, good fellow, who is well paid for what? Just simply for selling paint and varnish, and it is a constant struggle between these bright, shrewd fellows to see who can sell the most paint or varnish. Sometimes, though fortunately, not often, a not altogether scrupulous supply man, with his oily tongue and insinuating manners will convince your purchasing powers that he has a superior article for less money than they have been paying, and he will sometimes not only convince the purchasing powers, but the Master Painter as well, and if he can fool you, who are supposed to be, and ought to be, practical, how much easier is it to fool the other people. If such a man should fool your superiors, it is your duty to protect them, and in doing so you will protect yourself. No matter under what conditions the material comes, not even if you know that your superior would like you to favor a personal friend by using such material, don't sanction its use if you doubt its merit. Protest against it, and you will be a better friend to your superior than the other man. On the contrary, if some good reliable house offers your company as good material as you are using for a less price or a better material for the same price, don't let your prejudice or personal preferences prevail to the detriment of your company. You are justified in your prejudice or your personal preference just so long as you don't injure your company, but no longer.

There are, no doubt, instances where superiors have no confidence, or rather, not sufficient confidence in their Master Painters to defer, at any time, to their wishes or deductions, rather accepting the representations of the supply man, who may, or may not, be right—however honest he may be. You may not be getting as good results in some cases as some other roads using different material. The representative of the supposedly better material tells your superior that his goods used on some other road are giving from three to six months more service than what he is getting with his goods. He immediately comes to the conclusion, if he has any confidence whatever in his foreman painter, that the material is at fault; he switches over to the other fellow, and gets no better results. Then he loses what little confidence he did have in his foreman painter, and immediately proceeds to do an injustice to the company or the foreman. If he retains the latter, believing him to be incompetent, he is not doing his duty to the company; if he discharges the foreman without determining whether he was to blame (and the chances are he would, having no confidence in him), he would, in all probability, do the foreman an injustice. Why? Because the relations existing were not of such a nature as to inspire that confidence and intimacy that are absolutely necessary for the successful prosecution of the work. It may be possible that neither painter nor material were to blame. Perhaps the cars of that other road, if painted under similar conditions, would be no better. Or it might be, if your cars were painted under favorable conditions the material that was condemned might prove the better of the two, but you were so far away from your painter that he didn't have nerve enough to tell you what the trouble might be, for fear you wouldn't believe him if he did tell you the truth. If I were a Superintendent of Motive Power, Master Mechanic or Master Car Builder, I would certainly not appoint or retain as Foreman Painter any man in whom I did not have implicit confidence as to his ability and integrity, and I would get as close to him as I could. I would sustain him in everything, so far as I could consistently do so, just so long as I had full faith in his honesty and ability.

These are the relations that should exist in all cases, and when they do exist there is very little trouble in successfully prosecuting the work of a railway paint shop.

Now a word to my fellow members individually. Get as close to your immediate superior as you possibly can; tell him the truth at all times, even if it should put you under a cloud for the time being. It may be disagreeable, but it will pay in the end. When your superior is convinced that he can rely implicitly on your word, the relations will be such that neither he nor you will sever them willingly or cheerfully.

Be careful what you order and how you order. Don't put on your requisitions any article that isn't actually required, and don't order any more, especially of perishable goods, than your immediate necessities require. I don't suggest that you be niggardly in ordering. Have plenty, but don't acquire a surplus. Have your material in such condition that if the Storekeeper should call on you unaware you will not be ashamed of his report, and when you leave the service of your company, willingly or unwillingly, no one will be in a position to cast any aspersion on your probity or your integrity by saying that you left enough material on hand to run the shop from four to six months.

If you aim to keep a thirty days' supply, and order accordingly every thirty days, and do it intelligently, with an eye single to the utmost benefit to your company, I can almost assure you that the purchasing power will defer to any reasonable request you may make, and the relations between it and you will be mutually pleasant and agreeable.

President Bruning.—Gentlemen, what will you do with this report?

Mr. Little.—Mr. President, that comes under the head of an essay. I do not think we should take any action any more than to tender Mr. Gohen a vote of thanks for his favor.

Mr. Stroud.—I second that motion.

Carried.

THE OFFICIAL ORGAN.

President Bruning.—Gentlemen, there is an important matter to be brought up, and I have been advised by the chairman of the committee that he thinks it would be advisable to bring it up at the present time, so I will give Mr. Brown the floor.

Mr. Brown.—Mr. President and gentlemen, it is the matter in regard to the party or parties who will be our official organ. As was stated here yesterday, there is a prospect of our present official organ not continuing as such, and a committee was appointed to inquire into the matter, and we have a proposition from *The Painters' Magazine*. It has also been stated by Mr. Phillips that he would continue as heretofore until the end of this year; that would be until the first of January, and in the meantime it would give us a chance to look about so we could be connected with some more definite railway paper than *The Painters' Magazine*, although, as many of you understand and know, *The Painters' Magazine* is trying to do as well as it possibly can, and I will venture the assertion that they would not crowd us out with too much wall paper, as we felt some years ago. However, this matter is to be presented to the membership present for their consideration, and I would ask the assistant secretary to read the proposition of *The Painters' Magazine*.

Assistant Secretary Cook then read a letter from the manager of *The Painter's Magazine*, embodying the proposition made at the preceding session verbally by Mr. Schnell.

President Bruning.—Now, gentlemen, this proposition is before you for your consideration.

Mr. Little.—I move that this proposition be accepted.

Motion seconded.

Secretary McKeon.—Mr. President, the expense of adopting *The Painters' Magazine* as an official organ wants to be taken into consideration. We are asked to contribute one dollar per copy for *The Painters' Magazine* for each member annually. That is pretty steep; it is twenty-five cents higher than we have been paying; and we are asked to pay one-half of the cost of the stenographic report annually, which heretofore we have not done. THE DIGEST, or the *Car Journal*, paid the whole of it. We want to consider the expense before going into this, or we will be in a hole, as the saying is. And another thing, I have heard a number of members say, is it necessary to have an official organ if it is going to be such an expense?

Mr. Gohen.—Mr. President, did I understand Mr. Brown to say that Mr. Phillips had agreed to continue the publication until the 1st of January?

Mr. Brown.—Yes, sir.

Mr. Gohen.—It may be possible that he will continue to publish it after the 1st of January. How would that do? There is time enough, and while I certainly have no prejudice in the matter, I feel if we are going to have an organ at all, we should have a paper that is strictly devoted to railroad business. That is the way that I look at it. And while *The Painter's Magazine* is a very nice, readable paper and is full of information, it is a trade journal, and we are a railway organization, and we ought to keep ourselves identified with the railway papers, strictly so. I do not think we ought to be in a hurry in adopting an organ, and as we have from now until the 1st of January, I move that the matter be laid on the table.

President Bruning.—There is a motion before the house.

Mr. Gohen.—Well, I won't make any motion. I say we had better wait until the 1st of January.

Mr. Brown.—I would like to have Mr. Phillips make his own statement right here. We would all be pleased to hear from him. Mr. Phillips has the utmost kindness at heart toward this organization, and will do all in his power to be with us and help us along. I would like to have Mr. Phillips make his statement.

Mr. Phillips.—I can hardly say anything, beyond what Mr. Brown has said, except to correct a statement that he made in his opening remarks to the effect that there is a possibility of THE RAILROAD DIGEST going out of existence at the end of the year. I hope no such dire disaster is confronting me, but what I offered to the committee was, in consideration of the sentiment of the members of this association, with which I am well acquainted, I know that they desire to be represented in a railroad periodical, and in view of that I thought that pending the possibility of some change in the organization which now controls THE RAILROAD DIGEST, and which cannot be explicitly stated at this time, nor do I even know what it will be so as to be able to say it in definite terms—but in view of such possibility I suggested to the committee which had this matter under consideration, that if the association so desired, I would be willing and very pleased indeed to continue the department "The Railroad Paint-Shop," as it now stands in THE DIGEST, as your official organ until the end of this year, beyond which time I could not guarantee it. Up to that time, of course, I can say it shall be run on the same lines as heretofore, but there are possible conditions which may render me unable to carry the contract beyond that time. But up to that time, in deference to the sentiment, as I said, of the members of the association I should be glad to continue it on its present basis. And I also suggested to your committee that further consideration of the matter, after the lapse of that time, could be left in the hands of your president or your Executive Committee.

Mr. Gohen.—I call for the question on that motion.

President Bruning.—All that are in favor of the motion—the motion as originally stated was that the proposition of *The Painters' Magazine* be accepted. Are you ready for the question? As many as favor that will rise to their feet. This is a serious matter, and I want you all to stand up, those who are in favor of it.

A standing vote was taken, and the motion declared lost—only four members voting in the affirmative.

Mr. Brown.—I wish to state my reasons for voting against it—as I was chairman of the committee to interview those people and brought in their paper, not as any recommendation of the committee, you understand, gentlemen, but to place the matter before the body. Personally I am strongly in favor of being identified with a railroad periodical, and for that reason I voted against that proposition.

Mr. Lanfersiek.—In view of the fact that we are going to continue in THE RAILROAD DIGEST, Mr. President, I think it would be well to have this committee that has been appointed to look into that matter continued to take the matter up at or after the 1st of January, with power to act, and I make a motion accordingly.

Mr. Schumpp.—I second the motion.

Carried.

Mr. Brown.—I now move, Mr. President, that a vote of thanks be tendered to *The Painters' Magazine* for its offer and suggestion, and that should anything come up in the future we should be pleased to consider it again.

Seconded and carried.

President Bruning.—Gentlemen, we will take up now Subject No. 6.

"What is the best paint material to use for the protection of iron and steel tanks on locomotives after the same have been prepared to receive it?"

The President (Mr. Dane in the chair).—The first paper is by Mr. C. I. Eagle. Is Mr. Eagle in the room? Mr. Daly and Mr. Pebbles have the other papers. Have you received any of those papers, Mr. Secretary?

Acting Secretary Cook.—No, I have not, Mr. President.

Mr. Little.—Mr. President, if none of those gentlemen are present who have papers on that subject, I move we pass on to the next subject, and take that up later on.

Mr. Schumpp.—I second that motion.

Carried.

The President.—The next subject is No. 7.

"Has the painting of freight cars with the spraying machine shown that there is any economy in its use? Is it not rather an additional cost over brush painting, and does it not produce work of an inferior quality?"

Mr. Mullally's paper was then read by the Secretary, as follows:

PAPER BY T. J. MULLALLY.

In reply to this I beg to advise you that from my experience in the use of the paint-spraying machine, there is no economy in its use. It does not produce as good a grade of work, and while it may be useful at times, when priming stock cars or work of that nature, yet I do not believe that satisfactory results can be obtained in painting cars where you have to smooth the surface. For painting refrigerator cars with lead paint it is in my mind a failure. I therefore believe that the only advantage to be claimed for the spraying machine is that you can do a quick job on trestles or stock cars or work of that nature; but for general car shop work, I am not in favor of the use of the spraying machine.

Mr. Ginther then read the following paper:

PAPER BY G. J. GINTHER.

This subject has been before our conventions for some time, and in many instances pretty badly dealt with by its opponents. Still the sprayer will bob up again with defiance, determined to remain with us.

To handle this subject in a manner satisfactory to both the convention and the writer, I consider no easy task, since it involves so many conditions that are to be carefully considered before we can reach a definite conclusion, based on facts. There are certain requirements for performing the work, such as securing the most perfectly constructed machine for atomizing paint; one which is light in weight, convenient to fill, equipped with quick acting valves for controlling the air and spray; to have a requisite supply of compressed air, having a uniform pressure; suitable traps for separating the water which condenses in the air pipes and storage tanks, thereby having only dry air to come in contact with the paint as it is applied to the car; the place of operation securely piped, so as to dispense with the use of much hose which is troublesome to handle; a simple method of attaching the hose to the air pipes, such as standard air-brake couplings; a man to manipulate the ma-

chine who knows when a car is properly painted, and who is not prejudiced against introducing labor-saving machinery into the paint shop. The operator must feel a personal interest in the work, and since it is a new departure to him, he will realize that there is much to learn on his part, and that simply pointing the "gun" at the work is not all there is to it. With the above conditions properly met, I believe we can safely say we are prepared to successfully handle the paint sprayer in a manner that will undoubtedly prove that there is economy in its use, and it is not an additional cost over brush work, which is readily proven by a comparison of machine work against brush work.

I am sorry to say that I have not been able to realize such brilliant results as have been stated by members of this association, at some of our previous conventions, and I fear they have often presented too much of the smooth side of the subject, which frequently gets us into trouble with our superior officers, for whom we are working. I claim all the saving is in the item of labor, which alone is sufficient to recommend its adoption; and, as the system is yet in its infancy, we can look forward to greater results as we progress in furthering the greater possibilities of the machine.

The amount of paint consumed is about the same with both methods, although the actual amount which covers the car is less with the use of the machine. A part of the paint is carried away in the atmosphere, and deposited on everything close at hand, the operator receiving his portion also, sometimes causing him to feel that he is at the wrong end of the machine, which is one of the greatest disadvantages we have to contend with. I do not consider the sprayer has yet reached that stage of perfection, by which it is possible to do all classes of freight painting equal to brush work, but it will do a large amount equal to brush work, and much that, although not equal to brush work with regard to evenness of its application, is sufficiently well applied to answer all purposes. It is not necessary to turn out our freight painting entirely faultless, displaying a fine job of brush work as was once our pride when the equipment was less, and our time almost unlimited. Provided there is a sufficient body of good paint applied to every part of the car that is exposed to the destructive elements which paint is put on to combat, I consider we have done all that is required for practical purposes. At this busy age, when everybody is scheming to realize greater and better results, are we not forced to fall into line with other crafts and harness the wind and other forces to help us. When our railway officials make a purchase of a thousand cars, did you ever know them to send along with them several good painters to keep them painted. No, we simply have to dig up some method by which our present force can care for them. Our pride demands that our equipment has a good appearance. We want it as good as the best, and better than the rest.

I am forced to believe the sprayer has come to stay, as has every other mechanical device which has proved to be a labor saver, and we may as well accept it with a good grace and a pleasant look.

Would you to-day be without our compressed air paint burner, which has taken the place of the old punctured oyster can filled with hot coals, which is now hid away only to look upon occasionally to remind us of those good old days, or the sand blast, used for removing paint, iron scale and rust from tanks of our engines; also used for decorating glass, and many other uses; or the simple air device for transferring liquids from tanks or barrels into our stock room tanks? Would you again use the old hand pump, spending hours of hard labor, which we now do in almost as many minutes, or be without the simple machine which took the place of rattan paddles for cleaning dust out of plush and carpets, doing the work better and at a great saving of labor? The gilding wheel, and many other things might be mentioned, all of which are labor savers, and indicate that the paint shop has not lacked for inventive minds, and is keeping pace with the great tide of progress.

Gentlemen, we are far from being the tail end of the procession, even if we are (as is repeatedly said) the last man on the car.

The Secretary then read the following communication on this subject from Mr. G. E. Carson:

To the President and Members of Master Car and Locomotive Painters' Association. Gentlemen:—Please accept the greeting of one who has watched the proceedings of your interesting and instructive meetings from year to year. I assure you I have at heart your interest, and the interest of all matters pertaining to the government and successful management of a railway car shop.

My reason for advancing into a field foreign to my practical education is guided by a sense of duty. Too many geniuses are filling an unhonored grave while posterity enjoys the legacy they left after years of toil and deprivation. I am interested in the reading of Subject No. 7, as listed in your programme, and believe it will be discussed intelligently, and that you will embrace any facts submitted regardless of personality. I have read some very interesting articles with reference to the painting of freight cars, and have learned that there is a wide difference of opinion as to the relative merits of painting by spraying machine and by brush. I believe the arguments in favor of the brush process are not built substantially enough to withstand the bombardment of facts in favor of the spraying process. I write rather forcibly for one who has not reached the standard of art enjoyed by many of you; but as a quiet observer, viewing the situation from an economical point, which we must all admit is the saviour in all classes of business, I feel able to make an unbiased decision in favor of the spraying process.

The company with which I am connected has had a wide experience in painting with both brush and spray in freight car work. Our paint brush has been practically buried, and I would indeed be very sorry to see it unearthed. We are using at P. & L. E. R. R. Co. car shops what is known as the Quest spraying machine, and just credit is certainly due to the inventor, who, by untiring labor, has succeeded in uniting both genius and mechanism to produce a machine that handles material with economy and expedition. I assure you it gives our company the best of results. When speaking of best results we take into consideration the following: The advanced method of applying paint; the economical manner in which it is applied, and the evenness of the application, which is an assurance that all nooks and crevices are penetrated with the utmost despatch. The detention of cars being reduced to a minimum speaks volumes in itself.

Being officially authorized, and for self satisfaction, I have computed figures, which I here submit to your organization. If the minds of the sceptics are not swerved by these undeniable facts, we would be only too glad to repeat the tests in their presence to convince them:

TESTS.

Bodies of two P. & L. E. solid side coke cars, each containing 797 square feet of surface:

By Machine, First Coat.....Paint, $1\frac{3}{4}$ gallons......Time...........8 minutes.
" Brush, " " ..... " $2\frac{1}{4}$ " ...... " 1 hour and 40 min.
" Machine, Second " ... " $1\frac{1}{4}$ " ...... " ....7 minutes.
" Brush, " " ..... " $1\frac{3}{4}$ " ...... " 1 hour and 30 min.

One truck for each of above cars, containing 33 square feet of surface:

By Machine, One Coat......Paint, 1 pint...... . .Time.......... 2 minutes.
" Brush, " " ...... " $1\frac{1}{2}$ "........... " .. ..10 "

Bodies of two P. & L. E. steel hopper coal cars, each containing 1,326 square feet of surface:

By Machine, First Coat.....Paint, $2\frac{1}{4}$ gallons . ...Time. ....30 minutes.
" Brush, " " ..... " 3 " ...... " ....3 hours.
" Machine, Second " .... " 2 " ... . " ....30 minutes.
" Brush, " " . . " $2\frac{1}{2}$ " ...... " .... $2\frac{1}{2}$ hours.

One truck for each of above cars, containing 79 square feet of surface:

By Machine, One Coat.... Paint, 1 quart..........Time........$2\frac{1}{2}$ minutes.
" Brush, " " ...... " 3 pints........... " ....12 "

Thanking you for your kind forbearance, and for any consideration this letter may receive, I am,

Yours very respectfully,

G. E. Carson,
General Foreman Car Department,
P. & L. E. R. R. Co., McKees Rocks, Pa.

Mr. Gohen.—Mr. President, I move that the communication be received and be made a part of the proceedings of this convention. (Motion carried.)

President Bruning.—Gentlemen, this subject is now open for discussion.

Mr. Ginther.—I wanted to ask what style of car that paper referred to as being painted in eight minutes?

Mr. Cook.—It was a solid-side coke car, on the Pittsburgh & Lake Erie, containing 797 square feet of surface.

Mr. Quest.—I believe that letter came from our part of the country, and I am thankful for what my superior has done. While I am in the paint-machine business, I am not here to sell machines. I am here in the interests of my company as a master painter.

Mr. Gohen.—I would like to have Mr. Quest give us a little talk on that spraying machine business. One of our members who was so violently opposed to the spraying machine, I understand, has become one of the greatest converts; that is our esteemed friend Ball. I want Mr. Quest to tell what progress has been made in the machine.

Mr. Quest.—I have done some talking on the paint-spraying question; also, as you all know, written several articles. In fact I believe that several years ago I fired the first gun in our official journal on the paint-spraying question. We have tried to make some progress in the paint-spraying part of our business. The machine that we had several years ago would not be recognized by anybody that knew it then. It is quite a different apparatus altogether. We believe we now have a much better one; and not only that, but we are trying to make it still better, trying to make some improvements right along. The question of painting a freight car by air is a matter of control; if you control your machine in such a manner that there will be no waste of paint and you will not have a surplus of air, why, you are bound to get better results than where you do not have that control. An excess of air is just as bad as an excess of paint, from the simple fact that you have that objectionable gasification where you are using more air than is necessary to operate your machine, and that has been our object and aim in trying to better our machine. This test that Mr. Carson, the master car builder of the road that I represent, speaks of, as I understand, was made under his supervision. That is, he had men to supervise the test, measure the paint and weigh and take the time. There is one thing I certainly will do; I will verify the figures as presented. This question, as I understand it is confined to freight cars only. In direct reply to the question as stated I will say it has not; the work is not of inferior quality. I claim it is better than where you use cheap labor to apply the paint with a brush. The machine will work uniformly, even though sometimes it is in unskilled hands, but it should be used by a man that is properly broken-in to handle the paint-machine. A man who does not know what paint is for or what is its object has no business to handle a paint-spraying machine. Consequently, you want to put it into the hands of some bright man who will take advantage of the machine and understand what it can do, and its capacity. The idea that anybody can handle the paint machine is decidedly wrong.

President Bruning.—Mr. Quest, we want to know: "Is it not rather an additional cost over brush-painting?"

Mr. Quest.—Why, most decidedly no. I will also extend an invitation to any and all or anybody here to-day to come over and I think we can verify just what we say. We do our work out-of-doors. There are times when perhaps a little paint blows away, for the same reason you try to sweep out doors and you can't do that. Anybody knows that if you atomize paint it will fly. But our object in improving our machine is so that we can have the men hold the nozzle close to the work and do good work. That was our main object. And we are succeeding better every day.

Mr. Gohen.—Do you spray inside of the shop, Mr. Quest?

Mr. Quest.—Well, occasionally we do in the long shop, Mr. Gohen. But our work unfortunately is all out-doors. We have that old style sky roof that most of the railroads have.

Mr. Fitch.—How close to your work do you hold your spraying nozzle?

Mr. Quest.—In handling this control that we speak of we can hold our machine up within eighteen inches of the job and do perfect work and where the weather is ordinary—no excessive wind, a man can stand further back. With our machine we do not use any scaffolding at all for a box car, or for what they call battleships in that part of the country, steel cars; a man stands on the ground. That is a saving, no scaffolding.

President Bruning.—How would that work on a repair track, where, say, they get out seventy-five and a hundred cars a day and there are carpenters working all over these cars doing patch work, you would have 8 or 10 carpenters working on those cars and would have to have those cars ready to leave the yard, providing there was no lettering to do, the same evening; could you work successfully around with that spraying machine and not throw that paint all over those men?

Mr. Quest.—We work all around our yard. We could handle those cars, by holding the nozzle close to the work. The machine that we formerly had was a discomfort to the people who were working around the yard, but our machine now is an improvement.

Mr. Fitch.—You speak of excessive air pressure. What is excessive air pressure and what is the highest and the lowest pressure you can use successfully?

Mr. Quest.—If a machine would operate perfectly on 60 pounds it would be foolish to use a hundred pounds. If you forced up a hundred pounds air pressure through an orifice, that would only require 60 pounds to operate it perfectly, why, of course you would have this excess gasification, which is an objectionable thing.

Mr. Hutchinson.—Can you spray a varnish color?

Mr. Quest.—I will say that anything in the shape of varnish color is much more easily atomized than the flat color.

Mr. Russell.—I would like to ask a question. There they say that a man paints a car in eight minutes; that is 7 1-2 cars an hour. Will he paint 75 cars a day.

Mr. Quest.—This, as I understand, is just a test for speed, showing what can be done at one time. Our men have got to shift the machine over the yard and they don't do anything of that sort. Of course, I could give you figures as to a day's work, but I would rather not. I think you have had figures sufficient in this paper from our general foreman of car repairers.

Mr. Russell.—What is the lowest pressure at which you can work this machine successfully? The reason why I ask that question is that it costs twice as much to get air at a hundred pounds as it does at fifty, and it costs more to get it at fifty than forty. You know that we only get one-fourth of the pressure out of air that we put into it.

Mr. Quest.—Well, if it is in order I would state that a year or so back our people authorized our mechanical engineer and master car builder at that time to take one of the machines that we used over on the Lake Erie and make a test. They wanted to test the quantity of air required to force paint up from No. 1 machine, which is a back pressure, not a suction machine. This test, was made under the supervision of the mechanical engineer. He put a gauge on the machine; the pressure was cut down to forty pounds; they placed a man up on a building which made the nozzle sixty-five feet up; they cut the forty pounds of air in two, putting twenty pounds into the reservoir of the machine and preserving twenty pounds to work the nozzle, and it worked satisfactorily, according to the verdict of people who made the test. I believe that our people will verify all I say. That was forty pounds pressure; the pressure was divided, twenty pounds, passing in through the reservoir to furnish the back pressure and the other twenty pounds to work the spray.

Mr. Fitch.—Do you find that you can paint a car with the same amount of paint with a spray that you can with a brush?

Mr. Quest.—I can do it with less.

Mr. Fitch.—Less paint?

Mr. Quest.—Yes sir, under favorable circumstances. We will mix the paint the same way and I can do it with less. That is a fact, and if he will come over we will try to prove our assertion to anybody who is skeptical.

Mr. Fitch.—Do the men complain of it making them sick, or are they willing to use the machine continuously, or do you find trouble in keeping one man at the work for any great length of time; I am speaking of month after month?

Mr. Quest.—Well, I believe I can answer that question. At the beginning we did have trouble; that is, before we made these changes I speak of; but since that we have no trouble. We do not work one man continuously on the machine. We are up in a part of the country where certain classes of labor are a little scarce and, we have to keep training youngsters right along. By "youngsters" I mean the young men who will eventually be the successors of the experts in spraying, and machine hands when they leave the service.

President Bruning.—How many have you got, Mr. Quest?

Mr. Quest.—Well, we have ten or fourteen men who, in a technical sense, are very promising.

Mr. Russell.—I am looking for information. How much more does it cost for hose than it does for brushes, for this kind of work?

Mr. Quest.—Well, before we got looking around, we had no choice; the machine had come over to our place to stay, and we recognized that fact; we tried to get the best machines, we also began to look around for hose. We are to-day using a hose that is steel-lined on the inside. We pass our paint through that. We have on record 604 coats, all kinds of coats; that is, full coats; for one of those hose, before it had to be renewed. The cost of that hose is not great; I think the reason why that hose perished so quickly was that it had been run over a couple of times, and, of course, we couldn't get that inside lining up. If there was a little care exercised, it would be better; it was a matter of carelessness. But 604 cars was the greatest we got from any one of those special hose.

Mr. Gohen.—What was the relative difference in cost between the hose and the brush?

Mr. Quest.—I think that was computed, and if I am not mistaken a brush lasted for 110 or 112 cars. I am not sure about that; I wouldn't like to say that authoritatively.

Mr. Gohen.—Well, approximately.

Mr. Quest.—There was a great saving in the use of hose.

Mr. Gohen.—It cost less to use the hose than the brush?

Mr. Quest.—Oh, yes; and there was also difference in the labor, of course.

Mr. Fitch.—You have, as I understand, your paint in a reservoir, and force the paint from the reservoir through a hose. Is that it?

Mr. Quest.—Yes, and we also have a long nozzle which permits the man to stand back; he is not right up into the spray; there is not a machine that will atomize paint that won't produce that gasification, you have a certain percentage of it: that cannot be avoided; but we have our man stand back at a safer distance than he could as with one of the can machines. We have men over there that are husky-looking men that have been on that machine for three years.

Mr. Gohen.—I want to say a few words on spraying, Mr. President. This spraying question is one I do not think that we ought to cast aside with just a few passing remarks. It is one of the burning questions for our association. As you all know, I have not been in favor of spraying, yet I was not opposed to the principle; I have always claimed that I thought the time would come when there would possibly be a perfect sprayer, just as I firmly believe the time will come when we will have a perfect emulsion cleaner; we haven't got it yet, but we will get it; somebody will get it. There have been objections to the sprayer, and there have been vital ones too, but that the sprayer will do good work there is no question. I think it was about three years ago that I asked Mr. Harwood of the Chesapeake & Ohio, to paint for me a number of panels with a sprayer; I presume I have some 25 or 30 panels that were painted by him. My object in asking him to do that was to find out whether there was any permanency in paint that was sprayed on, or whether there was more or less than if done with the brush. He forwarded those panels to me; I had them sent to Mr. Block, at Brightwood, and exposed there. Mr. Block and I examined them two or three weeks ago, knowing this question would come up; and I want to say that while I had my doubts about it three or four years ago—I doubted whether spraying would last three years, I want to say that those panels that were sprayed are in just as good condition as though they had been painted with a brush. When I asked Mr. Harwood to spray those for me I told him just how I wanted him to spray them; I told him I wanted him to spray some of them one coat, some two coats and some three coats, and then to paint others with the brush one coat, two coats and three coats. I also asked him to paint them under different conditions of weather, when the weather was warm and dry and when it was cold and damp. I do not see any difference in the panels, whether they were painted in cold, damp weather or warm, dry weather. My little friend Rodabaugh told me I would have to climb onto the band-wagon. I am getting pretty close to the hub, I assure you. I am not quite ready to jump on the band-wagon, yet I think I will get there pretty soon. I am not as enthusiastic as Fred Ball; he has gone into it tooth and nail and they tell me he is painting the whole country up there too; Fred Ball is painting some eighty cars a day with a spraying machine. It is not a question whether the spraying will cost more or whether it will cost less. Supposing it cost less to the company, it will be still better; but supposing it cost as much, or if it cost even a little bit more, if we get a perfect sprayer and it does the work satisfactorily, why, our companies can then paint the equipment, which they cannot do now for they haven't got yard-room enough and they can't hire painters enough to paint them. If we can paint three or five cars with a sprayer where we can only paint one car with a brush, why, that will enable us to get our freight equipment into decent condition, which some of us have not got. There is only one thing lacking that will prevent me from going into the spraying business if I think Mr. Quest or someone else has produced a perfect sprayer; that is, that we are not just fixed now in the matter of air. We are getting there; we are making improvements and it will possibly be not long before we will have sufficient air. The demand for air has been so great at our shop that the paint shop has been practically cut off, with the exception of that which we use for burning off paint; but we will soon be in a position, and then I think we will try a spraying machine, and if we do, perhaps I may be on the band-wagon with Mr. Rodabaugh, Mr. Ball and all the rest of them.

President Bruning.—Mr. Quest, I want to ask you what success have you had lately—you have been doing some of it—in regard to doing the stencilling with the spraying machine?

Mr. Quest.—I want to say that we discontinued that practice. We rigged up a machine to do that class of work with, but we found where we had to place the stencils that a man could come along and hold up one hand and use a stencil brush and do it almost as quickly as he could with the sprayer. He couldn't handle the machine, on account of the weight, and hold up the stencil, but if that were overcome we could spray letters on.

President Bruning.—I am satisfied that you could do it and do a fine job too. There is the trouble.

Mr. Quest.—No question but that we could operate the machine and spray letters. Of course, we would have to use our lead a little heavier than we would for ordinary metallic paint, but we can do it, and I will state, if it is not out of order, that we had a test and we handled red paint on our machines that weighed 26 1-2 pounds to the gallon.

President Bruning.—Is there any other gentleman who has anything to say on this subject?

Mr. B. E. Miller.—I would like to ask these speakers how they overcome the water that is condensed in this air? We all know that on a damp-humid day a great deal of moisture is in the atmosphere, which all goes into the compressor and comes out through your paint nozzle. Several years ago I used the spraying machine for two years with very good success. It wasted a lot of paint. I wasn't able to paint with the same amount of paint by air as I was with the brush; I tried it a number of times but I couldn't do nearly as good a job; perhaps I didn't have the improved machines that our friend Quest has at the present time. I could never depend on stenciling that car the next day for the simple reason that in spite of all I could do I would have it on thicker in some places and thinner in others, and it would dry with a skin, and the minute you put your stencil on and began to stencil you would break through that skin in places.

President Bruning.—You can overcome that with a little practice easily enough.

Mr. Miller.—I never was able to overcome it and tried for years.

Mr. Quest.—You didn't have a good sprayer.

Mr. Miller.—Now, about the water, the principal objection that would condemn it for use on the start. I have painted cars in the morning; in the afternoon, a hot sun would come on them, and there would be blisters from one end to the other, caused by nothing else but the moisture contained in the paint. Who would advocate priming a wooden car or any kind of a car with paint which is apt to contain from two to five per cent. of water? Yes, I have seen a solid stream of water coming out of one of those paint machines.

President Bruning.—Probably your shop was not properly piped. You know I suggested two years ago that if you put in a line of piping to use for spraying, you should have traps located at different points so that this condensation would go into these traps and be drawn off.

Mr. Miller.—Those were put in toward the last. It did some good; still it does not overcome it. Take your air and hold your hand close to it, I don't care whether you have traps or

not, you will find moisture on your hand; I wouldn't undertake to say how much per cent. of water there is there, but it all depends on the humidity of the atmosphere at the time the air was compressed, and that alone, in the eyes of a practical painter, ought to be enough to condemn painting by air.

Mr. Gohen.—Mr. Miller, were you in the room when I made the statement about the panels which I received from Mr. Harwood, of the Chesapeake & Ohio?

Mr. Miller.—I was.

Mr. Gohen.—Now, that was one of the objections that I urged against spraying, that I thought the water that was in the air would hurt it, but I want to say in all candor and sincerity that there is not a particle of difference in the looks of those panels to-day, those that were sprayed in bad weather—wet, damp, cold, misty weather—or those that were sprayed in the clearest and driest weather.

Mr. Miller.—I have sprayed for several days and had no trouble.

Mr. Gohen.—You want to know who would advocate the putting of two to five per cent. of water in your paint. I want to say to you that there are very prominent railroads in this country that specify they must have a certain percentage of water in their paint. They claim they get better results from paint in which there is a certain per cent. of water.

Mr. Miller.—I will take mine dry.

Mr. Gohen.—I would be favorable to the non-waterd paint myself, but I have seen it done. Eerybody knows I have been no advocate of a sprayer, but I am willing to be convinced; and I have always felt that some day some man would get up a perfect sprayer, and when he does get it up I believe we can paint our cars with a sprayer. Now, if that time has come and Mr. Quest or somebody else has got it, let's get that perfect sprayer and get to work on it. As for Mr. Quest standing up here and excusing himself for being interested in that, why that is all right; no member of this association ought to be debarred from experimenting and getting up something that is for the benefit of himself as well as the companies; if it is for his own immediate benefit and not for the company we do not have to patronize him; but if it is a good thing I do not care whether Quest, Miller or somebody else advocates it, I want to get it, and I say a man has a perfect right to advocate a machine as long as he has got a good machine, so long as it pays our companies to use that machine and it is a good thing for it, for nobody is going to decry him because he has not had genius enough to get it up.

Mr. Quest.—I think that the trouble the gentleman mentions is due to his machine not being a perfect atomizer. A machine that is not well balanced in an atomizing sense—everything depends on that— will throw the paint out in clots, and if he has a rapid oxidizing paint it will certainly skin dry, and it will do the same thing if it is flooded on with a brush. So far as stenciling is concerned, of course you cannot stencil it the next day if a badly skinned-dry coat of paint is applied, but where a machine atomizes perfectly, the work should be closer than if applied with a brush, at some of the piece-prices you have now-a-adys. They certainly cannot follow the old style of putting it on and crossing it off. The machine cannot ask any questions of that kind. It puts so much paint on. If a man holds it too long in one place it will be the foreman's business to come around and see that he steps lively. There is as much foot-action in this as with the eye. The first thing we have to find out is whether he has good foot-action.

President Bruning.—How about the water, Mr. Quest?

Mr. Quest.—I have heard a great many objections, from a great many points, as to the water. Of course, if your compressers are taking in air on a day of great humidity, you certainly will have some water. Our yard is piped from one end to the other. We can go to any place and we can always find a cock to attach our machine to. Before he attaches his hose he blows that out. There is some little moisture, and when we are doing work in the winter, which we do, even in freezing weather, we have to use a mesh; we do that to allow a man to take his hose off and take the little frozen particles out. We don't shut down in the winter. We spray cars winter and summer.

Mr. Gohen.—If it is a perfect sprayer you wouldn't have to spray in the winter. You could do it all in the summer.

Mr. Quest.—Well, that is not my fault. I was about to say, concerning the ice, that we cannot help ourselves, the ice will be there, especially in the winter time; but those cars do not necessarily blister any more than if you put it on with the brush under the same circumstances, we put it on at times when we should not put it on.

Mr. Miller.—I would like to ask Mr. Quest if he does not occasionally have trouble with cars blistering on account of the dampness conveyed into the paint through the sprayer.

Mr. Quest.—I think that most of our blisters, especially on old wooden cars are due to the moisture on the old surface. When we spray on the paint we practically seal that up and then of course if you have a little sun, it will draw out and make a blister. It most undoubtedly will.

Mr. Copp.—I would like to answer Mr. Miller's question about moisture. At our Somerville shop some two or three years ago, at our master car builder's request we painted a mail car from the wood up to the varnishing. every coat, priming and surfacer, by air, including the color. That paint has stood as well as if applied with brush, and I very much doubt, if any of you men saw that car to-day being cleaned and varnished, would know it from a brush job. I wouldn't myself except from the number of the car. Now, that shop is not piped on any scientific principle at all. It was done on a sort of by-guess-and-by-gracious way, and if there was any moisture to interfere with the durability of paint, I think you would see it on a car of that description quicker than you would on a freight car. I must say that I would have to answer this question No. 7. in the affirmative. We have two shops on the Boston & Maine. One of which is equipped to paint with air, and the other is not laid out with appliances to do that work. At the shop where painting is done by air three men have done all the work; at the shop where they do it by brush it has taken eight men to do about an equal number of cars; so you can judge for yourself. The car painted at the Somerville shop to which I referred a few moments ago was done by Mr. Worral. He can answer any question you want to ask. Of course, as a practice we are not painting anything but freight cars and passenger car trucks, but this job I refer to was done at Mr. Chamberlain's request, for his own information.

President Bruning.—Mr. Copp, you have reference merely to the first section of this subject, I presume: "Has the painting of freight cars with the spraying machine shown that there is any economy in its use?"

Mr. Copp.—That is the question that I answered in the affirmative. I merely cited the other matter to answer Mr. Miller's objection.

Mr. Worral—The car Mr. Copp referred to as a mail car, was a baggage car; and Mr. Chamberlain wanted to experiment with it, so he had the old sheathing all torn off; and we resheathed the car; of course, the carpenters took the same amount of pains as they would with any other car; and I primed that car with lead priming, we sand-papered the same as would be done with a brush, gave it three coats of lead and two coats of color, and varnished it with a brush. To-day it is just as smooth as any other car. Of course, we worked hard. We didn't put it in Tom, Dick and Harry's hands, but into the hands of a careful man. In the spring I had this car in the shop, and I wrote Mr. Chamberlain a letter about it, and he thanked me very kindly because, he said, "I was thinking the other day how that particular car was coming out." I told him it was all right, and so far as I could see, was rather better than cars we had painted with a brush at the same time.

Mr. Fitch.—Mr. Worral, did you sand-paper the various coats of lead before the others were applied?

Mr. Worral.—We sand-papered just the same as if we had brushed it.

Mr. Hutchinson.—The process was the same?

Mr. Worral.—The process was just the same. I have ice cars running on milk trains that I varnished with the spraying machine three years ago and they are now no different from the ones done with a brush.

Mr. Hutchinson.—What spraying machine?

Mr. Copp.—I think that was a Kahler machine, was it not?

Mr. Worral.—No, that car was done with the McMaster machine, but the Kahler machine is just the same. We painted all our trucks last winter working every day; a man used that machine day in and day out; in the spring when I wanted to lay him off he begged of me to keep him at work; he wanted to work; and he did the trucks of two cars every day.

Mr. Hutchinson.—You do not paint the step with this, do you?

Mr. Worral.—No, because it would fly upon the body of the car.

Mr. Fitch.—I want to add my approval of the spraying machine. We use it on our road for freight car painting and use it successfully; we paint cars there that I would defy anyone to tell that they were not done with a brush. The only thing you could tell is by paint being spattered around in places where a brush would not reach it—under the car for instance. We paint a car in the morning and often letter it in the afternoon. I have found that we use a little more paint with a spraying machine than with the brush; part of that paint goes on the car, part not. We have never had any trouble with the paint skinning-over and never had any trouble in any way, and I would not dare to recommend, for a moment, that we should not use the spraying machine on our road.

President Bruning.—How did you stand on this subject two years ago? I think you were rather opposed to it, were you not?

Mr. Fitch.—I was not much in favor of it. I felt that there was not so much gained by it. I thought that we should use enough more paint to nearly offset what we might save in labor; but I am satisfied now that we do not. We are using it so successfully that, as I say, we paint our cars two coats, and it would be almost impossible for one to tell that they were not done with a brush if there was not paint spattered around in certain places, which you could not reach with a brush.

Mr. Gowe.—Mr. President, we are using a spraying machine and I do not see how we could get along without it unless we had two or three more men. We are using it successfully. We have three men working and they take a week alternately.

President Bruning.—Any one else want to have anything to say on this subject?

Mr. Russell.—Mr. President, I haven't heard anybody answer the question asked in this programme. It says: "Has the painting of freight cars with the spraying machine shown that there is any economy in its use?" I have no doubt at all about its quality of work. I have used it. I know it does good work, and I know also it will do more work with the same man, but the question is, is there any economy in its use? Would it save in labor what it costs to furnish that air? Does not the hose cost more than the brushes? I have used $14 worth of hose on my machine in less time than I would use $14 worth of brushes. The point is here: when you come to furnish your air, are you not paying more for the painting of those cars with air than you are when painting them with the brush? I would like to have some one with experience tell us whether it is cheaper or not. We know it can do the work.

Mr. Rodabaugh.—When air is used so successfully for painting cars or used for other work around the shops, is the expense of that charged exclusively to the paint shop

Mr. Russell.—No.

Mr. Rodabaugh.—Then you must take that off. When a yard two miles long and possibly one and a half miles wide is piped with air, probably twenty carpenters are using that air all the time; they may be using it on the grindstone; may be using it for boring holes or a good many purposes on the cars or around the cars; may be using it in the offices for fans.

In regard to hose, my experience has been, that the best we could get would not last over three weeks, and that would paint, say, an average of eighteen cars a day; and I have never been able to get any hose that would last any longer than that. Steel-lined hose I wouldn't give a cent for; it is the worst thing to handle there is around a yard.

Mr. Miller.—I would like to ask some of these gentlemen—Mr. Quest in particular—if he can tell me what the average cost of spraying these cars is. For instance, what is the average cost of spraying with machine your ordinary sixty-thousand capacity, wooden hopper cars or gondolas?

Mr. Quest.—Well, I do not know exactly what the cost is, but I can say we are saving a hundred per cent. in labor, no question about that—as the direct result of spraying; the cleaning is just the same as it always was. When you get something in the air line that will clean a car, then you will have something to talk about. You have already had figures as to the operation of painting. There certainly is a big saving.

Mr. Miller.—What I want to get at is the average cost. Your foreman car-repairer gave very close figures there on the subject of these tests. Now, a man cannot average that. What can a man do in a day and what will it cost? Take, for instance, a 60,000-pound capacity hopper car.

Mr. Quest.—Each day that a man makes a run with the machine, he takes the number of coats he does, and we have several places where they run thirty coats in nine hours. A man receives $1.75 for doing it. I will leave you to figure the rest.

President Bruning.—Gentlemen, what will you do with this matter now? The time is getting late. I think it has been thoroughly discussed. Will someone make a motion. It should be disposed of. "Has the painting of freight cars with the spraying machine shown that there is any economy in its use?"

Mr. Fitch.—I move that it is the sense of this convention that it has shown economy.

Seconded.

Mr. McKeon.—Mr. President, I would like to have embodied in that motion, "providing we have a good spraying machine," that is, the most approved machine. Two-thirds of the spraying machines in use to-day are not fit to spray with.

Mr. Fitch.—There are plenty of good ones; you must get a good one.

President Bruning.—Do you agree to embody that in your motion, Mr. Fitch?

Mr. Fitch.—There is no objection. Of course you should have proper tools to work with in all cases.

President Bruning.—You have heard the motion. As many as are in favor of it will rise to their feet; contrary the same. (17 rose as in favor of it, 9 opposed.)

President Bruning.—The motion is carried.

Mr. Nicholl.—I move we adjourn until to-morrow morning at nine o'clock.

Seconded and carried.

Adjourned until Friday, September 13, 1901.

Fourth Day's Proceedings

FRIDAY, SEPTEMBER 13, 1901.

President Bruning.—Gentlemen, the first thing in order this morning will be the appointment of the committees, which was overlooked yesterday. The first committee appointed will be the Committee on the next Place of Meeting. I will appoint Mr. Gohen, Mr. Kautter and Mr. Ginther on that committee.

The next committee will be the Committee on Resolutions. I will appoint on that committee Mr. Copp, Mr. Brown and Mr. Little.

President Bruning.—We will now take up Subject No. 3.

"What is the best method of preparing steel freight cars for paint; and what is the best material to use?"

We have a paper on that subject by Mr. B. F. Seisler, of the P. & W. R. R. Co., Allegheny, Pa.

Mr. Seisler then read the following paper:

PAPER BY B. F. SEISLER.

In answering the question propounded in Subject No. 8, I desire to first call attention to some of the difficulties not within the power of a painter to overcome, notwithstanding which the painter is expected to give the same satisfactory results as in painting iron tank plate as manufactured several years ago, when pressed steel was not in general use for freight equipment.

The preparation for painting new steel cars should begin at the very foundation, that is to say, the scale should be removed from the pressed sheets before the cars are constructed; the sheets should then be primed with no less than a standard grade of paint. There would then be a good foundation to work on, and the result would be more satisfactory. In a great number of cases I have cleaned off this scale from steel sheeting with old files, wire brushes, block emery, etc., with very poor results. The removal of the scale could be accomplished at reasonable expense, and with very satisfactory results at the manufacturer's plant by the application of a sand blast on each sheet after being pressed into shape, then primed, after which they could be stored as stock. If this were done we would then be rid of the great obstacle, that obnoxious scale, and the pressed sheets would be well protected from rust.

It is hardly necessary for me to state that the scale, or oxidation of the steel, is a separate substance not closely adherent to the sheets, and that a slight jar will cause it to fall off or flake in spots, the scale, of course, carrying with it any paint it may have on it. Visit almost any of our manufacturing plants and you will find stacks upon stacks of sheet steel practically covered with rust; and this material after being constructed into cars is turned over to the paint shop with the expectation

that the painter can compound some preparation that will preserve the steel from further decay.

After a careful investigation I have found that open hearth steel is most susceptible to rust, it being the refined product of iron. There are no miniature layers of slag (as in iron) to retard its action, and this oxidation when started, and not altogether removed, will continue, even if coated with the finest quality of paint.

It is hardly probable that the removal of rust, entirely, from cars would prove profitable, so that the only recourse the painter has is to scrape the loose rust off with a steel scraper or wire brush, and then paint it; this coat of paint would only temporarily retard the action of the rust, for the reason that the rusted surface of the steel is not firm enough to hold the paint without defects, and these defects would admit oxygen, when rust would continue. As I said in the beginning the preparation is the great essential point, and when that is absolutely outside of the painters' control, it is not just to expect too much from him. The removal of the scale and the priming of the pressed sheet are not an absolute safeguard from rust.

May I say further that in some cases the material used in the construction of these cars is not always of a high or even standard grade. In fact, much of the material used is of such a poor quality (as shown by the chemical analysis) that the ingots would scarcely stand under the rolls, and often much of the plate must be sheared away to obtain a plate free from cracks. While it is hardly probable that it will be considered more profitable to build these cars of the highest grade of material, and inferior grades will likely be used, my contention is all the more strongly made that the pressed sheets should be subjected to the sand blast before rust takes place, then painted immediately, so that when the car is built, it will be found that (the paint) has had a friend to help it in its life of travel.

In regard to the best paint to use, any of the following will give as good satisfaction as can be expected.

No. 1. Prince's Metallic Brown.

No. 2. Prince's Metallic Brown and Red Lead.

No. 3. Prince's Metallic Brown and Lamp Black.

Gentlemen, the next paper will be by Mr. B. T. Wynn, of the Pennsylvania Railroad, Pitcairn, Pa. We will have the Secretary read his paper.

Acting-Secretary Cook then read the following paper:

PAPER BY B. F. WYNN.

In regard to the cleaning of scale and rust from steel cars, I have used a hand hammer, and a rotary wire brush attached to a pneumatic boring machine, but found it would not answer the purpose. I then had a die made, slightly oval on the edge so as not to cut the iron, and used it in a pneumatic hammer, and found it to be the right tool. I have had no experience with the sand blast machine; I have no doubt it could be used to advantage where the rust is thin, but where it is from 1-8 to 1-4 of an inch thick, which we often find on the bottoms of some of our steel cars, it requires a hard blow or jar to loosen it. This can be successfully done with the pneumatic hammer, and a wire hand brush to remove the thin rust. It requires from ten to fifteen hours to remove the rust and scale from a car, using a hand hammer; with the pneumatic hammer the same work can be more thoroughly done in 4 or 5 hours—it depends somewhat on the condition of the car. This I believe is the best method of preparing a steel car for painting. Much depends on the care taken in removing every particle of rust and scale to insure good results.

As to the best material to use, I consider this a hard question to answer. I have used red lead, asphaltum, and red oxide; in my opinion, a good elastic paint would be more durable. I would advocate one coat on the inside and two on the outside; my reason for giving the inside but one coat is that, where the paint is thick, it is more liable to be scraped and worn off when the car is being loaded from a scaffold or wharf. With the best of material, the life of the paint is short on the inside of a steel car.

As I said before, the question of the best material to use, is a hard one to solve, as there are so many structural iron paints on the market, each claiming to be the best. The best way to make a practical test of the different so-called "best paints" for the prevention of rust on iron or steel cars, would be to paint several cars with the different kinds of material made for this purpose, and when they go into service, to closely observe them from time to time. We seldom have an opportunity of making such a test, for the reason that when our cars are painted and put into service, it is rarely, if ever, that we see them again. All the P. R. R. steel cars are painted with Red Oxide.

President Bruning.—The next paper, gentlemen, will be by Mr. Eugene Laing, of the Northern Central Railroad, Elmira, N. Y.

Mr. Laing.—I would like to have the Secretary read it as I have a sore throat.

Acting-Secretary Cook then read Mr. Laing's paper as follows:

PAPER BY EUGENE LAING.

In considering the subject assigned to me, I am forced to say that it is a very difficult matter to arrive at a proper solution of the question.

Regarding the first question, "What is the best method of preparing steel cars," I would like the members to examine samples of paint taken from a car that has been in service seven months; it will be seen that car was not in any condition to receive paint, for the reason that the water scale had not been removed; as soon as the paint was broken and dampness got in, rust did its work, if the rust was not there before it was painted.

There is only one way to remove the rust and water scale from steel cars or tanks successfully, and that is the sand blast, as in removing it by wire brushes and pickling in a solution of sulphuric acid, it is almost impossible to remove all the rust and scale and all traces of the acid must be removed by washing and be thoroughly dried and painted before it becomes oxidized; but with the sand blast good results can be obtained, leaving the surface perfectly clean and dry, ready for painting, which should be done as soon as possible before any rusting takes place, as it is well known that rusting will continue under the paint if it is there when the paint is applied.

The second question, "What is the best material to use?" is one that I think none of us could or would like to answer, as a paint that will stand on iron and steel cars must have many essential qualities, such as covering, elasticity and durability. It will not do to have it a coarse, heavy pigment, but it must be a fine, firm substance that will cling to the iron and be elastic, one that will stand the expansion and contraction, and yet be hard enough to withstand the rough usage the cars usually receive.

I think there is no paint that will stand the usage that coal cars receive on the inside due to loading and unloading, especially soft coal, with its sulphur and saltpetre, which destroys the paint and makes rust. More real damage is done to the cars on the inside than on the outside, as in most cases which have come under my inspection, the paint on the outside has been in good condition, while on the inside the steel was nearly destroyed, with a coat of rust that would soon eat its way through to the outside.

A paint to have such qualities must be made of pure linseed oil and a suitable pigment to produce a paint that is adhesive and elastic when dry. The best pigments are ochers, lamp black, red lead, oxide of iron and graphite. The ochers being but different kinds of clays make a good cheap paint, which will withstand the action of the weather, and is suited for either iron or wood. Lamp black is a form of carbon which will contain more oil to the gallon than most any other pigment of equal weight and will remain elastic as long as, if not longer than, and prove as durable as any other; the chief objection to it is its color. Red lead being coarse and heavy settles in the pots, also on the work, with sags which make a poor looking job if extra care is not taken to well brush it out. On account of its drying qualities and the small amount of oil it will hold it soon becomes hard and brittle; but I think it would be as good paint for the insides of coal cars as any, as it will withstand very hard usage, under which a softer and more elastic paint would soon become abraded and worn away. A good oxide of iron (being fully 75 per cent. of iron) which will hold a high percentage of oil is also a cheap material, and dries elastic, with good covering qualities. In almost any shade of brown it is one of the best pigments. Graphite, for use as a pigment, is as fine as can be got, and will hold as much oil to

the gallon as any of like consistency except lamp black; it has good covering qualities and is durable. Of course some such trouble as sags occur, as with red lead, but not so badly; it dries elastic and is durable.

As to color, if a brown is desired, I would use oxide of iron with it to secure the color needed. Graphite, lamp black and oxide of iron do not affect the oil; the change which these paints undergo while drying is in the oil only. These pigments, being equally suitable for use on iron, steel or wood, no great mistake can be made in the use of any one of them, so any of these three, mixed to dry elastic, will give good satisfaction; but to say which is the best of these I would rather wait until I have had more experience with painting iron and steel cars, or until I have attended the fiftieth annual convention of this association!

President Bruning.—Those are all the papers on this subject and it is now open for discussion.

Mr. Gohen.—Mr. President, I assume that this is a question that is not only engaging the attention of the master painters of the country, but it is also largely engaging the attention of the managers, who look to us or depend upon us to propound some way to preserve this armor of steel. Now, we can readily see where the outside of a steel car might be protected from rust, especially so in such cases as Mr. Seisler speaks of, if the steel were coated immediately at the mill, and I believe it would be a very good idea if we could get our railroad companies, in ordering the steel for cars, or the manufacturers who place these upon the market, to have these steel sheets coated at the mill before they are shipped. You have noticed, possibly, in painting an old tank or a steel tank that had been rusted, wherever the trade-mark or shop-mark of the mill was placed upon that sheet (when it was possibly warm and before any moisture had crept into the steel) that when you have removed the rust and scale from the tank that place was perfectly free from any rust. Now, if that be the case where they mark it, why wouldn't it be the case if they would paint it all over? But I do not think the outside of cars is so much a problem as the inside. Yesterday my good friend Mr. David Little in talking about this, told me that a suggestion was made, I think by our friend Ball, of the Pennsylvania Railroad, which may be worthy of attention. He suggested that the inside of these steel cars be coated with just an ordinary crude oil. But I think he went too far, if I understand it right. He suggested that every time they were unloaded that they should be swabbed over with this oil. I think that would probably be a very expensive experiment, while it might prove satisfactory in the end. But the idea seems to be a good one and in that line I would say that a good spraying machine will probably be the proper thing with which to apply that oil. Mr. Laing, in his paper, speaks about adding pigment to a linseed oil for the inside of a car. Well, in my opinion, if we could get a coating of oil on the inside of a car without any pigment whatever, it would be better than if that pigment were applied, because we know that when we add a pigment to the oil it hastens, or I suppose it would hasten, the oxidizing and would form a coating there that would be heavier than the oil itself. I think a crude oil would be more penetrating than a linseed oil, if there was nothing in it to form a coating on the outside but merely to get into the grain of the steel to protect it. I think if our companies would make some arrangement to have them sprayed at the mine, when the cars come there to be loaded up, with a crude oil alone at such times as would be evident it was necessary to do so, it would be a great preservation to those cars. Now that is my opinion; I do not know; I haven't had any experience in steel cars, but from my ordinary experience in painting tanks, and such as that, I think that the spraying of a steel car on the inside at such times as it was evident that it was necessary, would be the only proper method for preserving the life of the car, because we know that when a car is loaded with coal, that the motion of the cars in switching causes a great deal of friction by the movement of this coal, and any pigment that you might put on there I think would be removed from the inside of that car more easily than a simple coating of oil. So what we want to do is to get just as little coating inside of that car as possible so that it cannot be removed; let what is applied there adhere to the steel and put nothing on there that can be readily removed. I may be wrong, but it seems to me that Mr. Ball's idea is a proper one in this respect.

Mr. Laing.—Here are some samples of paint (indicating) taken from a car that ran seven months—from the outside of the car. I just took them off with my finger. The paint is perfectly good; it is elastic, but has come off, scale and all.

Mr. Gohen.—This sample is a leaf of good, lasting pigment and oil. Now, that same coating of paint applied to wood would be all right, but it is very evident that there was something to cause this paint to scale off from that car, and I assume, Mr. Laing, that it was the rust that was under this; wouldn't you say so?

Mr. Laing.—It was the rust that was under it.

Mr. Gohen.—Now, what we want to do is to have this car built in such a way that this rust will not accumulate after it is painted, and I believe, as I said before, that if these sheets were coated immediately upon their being rolled, or as soon after as they were cool enough, not cold, but just as soon as they were cool enough to apply a coating to them, I believe that you would not get that result. It is the after moisture and dampness which crept into this steel which caused that paint to separate from that steel.

Mr. Laing.—That seems to be so. I noticed the same thing in steel tanks, they would be bright and good, but when coated over and run a while they commenced pitting, and the rust would run out; that was under the scale, but it was between the scale and the iron where the rusting took place. Until the scale is removed by sandblast, or something else, I think that rusting will take place under the scale as well as it will on top of it.

Mr. Seisler.—I wish to say, Mr. President, that I think the scale should be absolutely removed from the steel. I will tell you why. Scale is ferric hydroxide—a form of oxidization. Here are some samples I wish you would examine. Some of them came from a car that was wrecked. They show the parts where the scale has little vines of rust, and other parts where the rust took the scaling off completely.

Mr. Gohen.—It is a question with me, Mr. President, whether this rusting, which comes immediately under the scale, is an inherent property of the steel or not, or whether it is an acquired property after the steel has been manufactured. That is a question I presume that some of these steel manufacturers, these experts, will enlighten us upon, whether in rolling a sheet of this steel you can roll it without these rusting properties being contained in it or whether these rusting properties get in after the steel has been rolled. Now, if this rusting process is not an inherent process in the steel—and I do not believe it is—I believe the rusting begins after the sheet has been rolled. If we can put something upon that to exclude the dampness, the moisture which this steel-sheet takes up after it has been rolled, I do not believe you are going to get any rust there, because rust will not form without a combination of air and water. Now then, the air is probably in that sheet when it is rolled. That is what absorbs the moisture after it is rolled and becomes cold. I may be wrong. I am not an iron man or steel man; I do not belong to the Amalgamated Association or anything like that, but I take a common sense view of this thing and I do not believe rust is an inherent property of a sheet of steel freshly rolled, I believe rust comes afterwards. I believe too that it can be obviated; if you put something on there to keep that dampness out after the sheet has been rolled I do not believe you will have any rust.

Mr. Butts.—I agree with Mr. Gohen in his idea of coating the sheets immediately after they come from the rolls, as soon as they are cool enough; and as evidence that that would be a protection I call your attention to the fact that the sheets are marked, the numbers of the sheets, sections, etc., by the manufacturer; I don't know what they use; it looks like white lead; you will notice that, wherever that is put on, it never flakes or peels off years afterwards.

Mr. Gohen.—That is true, Mr. Butts.

Mr. Butts.—It is always there intact, perfectly smooth. You can clean your car five years afterwards and it will show that impression, perfectly smooth.

Mr. Gohen.—And no rust there either.

Mr. Butts.—None whatever. It never occurs under those markings. That is positive evidence to me that if that sheet were coated immediately after it left the rolls, it would prevent rusting. It does not make much difference what that coating is.

Mr. Laing.—Mr. Rodabaugh, yesterday, made a very sensible suggestion of coating the sheet under the stakes, wherever it

was covered, before they were rivetted on. If these sheets were covered in that way, before the car was put together, that would stop the rusting too, because they rust under the stakes or wherever a stake is put onto the car, it commences under there and rusts right out and spreads from that point.

Mr. Lanfersiek.—It would appear from what Mr. Gohen and Mr. Butts have said that when steel is painted immediately after it is rolled, that it would never rust. It looks reasonable, as far as that is the case, and we have all seen that to be the case in a great many instances where slight marks or figures are made. My opinion is this: that steel, even if it is painted immediately after it comes out of the rolls, there is a certain flash on the surface of that steel and if you paint over that you will certainly house a great portion of air under the scale, and it is the air that is housed-up under the scale and covered with paint that produces the rust, and unless the scale is thoroughly eradicated, I believe you will undoubtedly have rust, because there is a certain amount of water in air and the dampness that comes from the inside and outside will produce a condensation and that is the beginning of the rust.

Mr. Gohen.—Mr. President, I do not know that I can quite agree with Mr. Lanfersiek in this matter. I have never been around rolling mills to any extent in my life, but it seems to me that there would be no dampness whatever in a sheet of steel when it had passed through those rolls, because we know that a sufficient degree of heat will eliminate all dampness, but it may not eliminate air. There would still be a certain proportion of hot air in that steel. Mr. Lanfersiek speaks about there being this flash. This flash, if I am not mistaken, is identically the same substance as the softer material under it, but, being upon the outside, it becomes case-hardened, and possibly by the addition of water which is dashed on this in the roller, but the heat is so intense that it evaporates all that water. But you can put all the air you can get into a sheet of steel, I don't care what per cent. you may put in there; you can put all the air that is possible to get in there and if that be a perfectly dry air it would not rust in a thousand years. On the other hand, you may immerse that sheet of steel in a tank of water from which all the air was eliminated and it would stay there a thousand years without rusting. It is only where there is a combination of the air and the water that rust supervenes. I believe that there is no water in that steel when it is rolled, but I believe there is air. Now, if we can put some coating on there that will elminate or that will keep the water from penetrating that steel, I do not believe you will ever have any rust there.

President Bruning.—Mr. Gohen, I think it would be almost impossible to get any kind of air, hot or cold, but what there would be more or less moisture in it.

Mr. Gohen.—You know that you can eliminate air from water and you know that you can eliminate water from air. It can be done easily. You boil water; when you get water to a boiling point, these bubbles that you see are merely air that is leaving the water, and when you boil it sufficiently you get all that air out. Now, if you can create a vacuum and you bottle that water up, you can immerse your steel sheet and it will remain there for years without rusting.

Mr. Lanfersiek.—Of course, Mr. President, I did not intend to assert that, during the rolling process, the air would be combined with the steel; what I mean is this: after the sheet has been taken out of the roll, thrown on the ground, and has lain a sufficient time to cool, not thoroughly cooled off, but somewhat hot, and of course that would help the drying of the paint; but that sheet is covered with a flash on the surface and between the flash and the surface of the steel proper there are little pockets there, little crevices filled with air, and you cannot get that air out when you paint it over; you would seal it under there. I think the condensation of that during the various changes of the atmosphere is what produces the result. But if this scale were thoroughly eliminated those air-pockets would not be there and you would run much less chance of having rust than if it were not taken off.

Mr. Butts.—I would like to ask Mr. Lanfersiek a question. I would like to have his opinion as to why it is that the steel sheets never rust under those markings that are put on there by the manufacturer.

Mr. Lanfersiek.—If you examined them closely you will find there are a great many particles of rust under those marks. The next time you see a thing of that kind you notice it. You will still find there is some rust there. While it does not rust as quickly nor as much as it does other places, yet notwithstanding there is some there. If there was any rust under them why then, of course, your theory would probably be true.

Mr. Butts.—I account for that in this way, that the marking is small and after long standing they crumble on the edges and a certain amount of moisture works underneath; but if the sheet were coated and we could keep the paint on as long as those markings, you would make a large step in advance of anything that has ever been done.

Mr. Miller.—Mr. President, I would like to ask if it is not a fact that these markings on these sheets of steel are placed on these sheets at the mills while the iron is still hot and warm?

Mr. Gohen.—Yes, they are.

Mr. Miller.—Thus excluding all the moisture and preventing the rust. Then if that be a fact, of which I am not positive, but I believe it is——

Mr. Quest.—All the marking of iron is done after it is sheared.

Mr. Miller.—Is it still warm?

Mr. Quest.—No, sir, not as a rule: it is cold; they handle it cold; and the markings that you speak of are nothing more often times than carbon oil and white lead; owing to its fluidity they can handle it easily; they thin it out with a little carbon oil to do the marking. I have often also noticed this feature that the gentleman has spoken of; that for years and years you clean your tank off; probably one or two times, and you still have that there, clean and bright; the under surface would be intact, just as our friend Butts has remarked. Now, so far as the flash, or iron oxide, is concerned, it is a matter of impossibility to roll either steel or iron without having that material on the surface of it, and of course, if iron is protected, even though that flash could be covered up at once with a protective coating of paint and there are no abrasions or anything of that kind to allow the water to go under it, it will stay on there a number of years. But in case of abrasion the water will work under it and carry that off. My people, a short time ago, asked me about what deterioration I thought would occur in a year, and the only way I could compute that was by taking a car that had run something over a year, and I took a number of scales off that car, and when we concluded our measurement we found we had about the .79 part of an inch, showing that much deterioration in that time. You probably have heard me assert several times that we have a sand-blast system by which we clean all our tank iron before it is used for structural purposes, and I assure you, that we take every particle of rust and iron oxide off, and we have a fine, clean surface. Now, in case something comes in contact with that when it is lying in stock, which is out-doors, why, we find we have rust. Consequently, the only way I think you can protect it from rust is by a protective coating, and just so sure as you have an abrasion, you will have rust. A blacksmith, as you all know, when he takes a piece of iron out of the fire and puts it onto his anvil, is very careful to knock off that flash; he does not want to hammer it in. Now, the rollers do not discriminate so nicely; they just simply roll it in there, right on the surface. They do make an attempt to clean those rolls; they have a man there with hob-nail shoes on and a great steel brush, and he gets over it and gives it two or three little pushes, and all that sort of thing, and that is all the cleaning it gets. He does not take off the loose stuff. It is the loose stuff that you have the trouble with in its use for structural purposes. The only way, to my mind, is to remove flash by sandblast or other system; of course the sandblast is the best.

President Bruning.—In speaking about this white lead marking, is it not true that a great portion of all the sheets we receive have not got these blisters on them, and is it not frequently the case that the marking is done in spots that are perfect, this white lead?

Mr. Quest.—As I understand the thing, I think that would apply more to the old iron that we would get than what they call the crucible steel rolled sheet. There is so much of it; there is what they call the blue-planish and there is the red-planish; and it has been my pleasure to know that the red-planish will not perish as fast as the blue-planish. I am not well enough posted in iron making to explain why; it is only the practical features of the case that I have particularly noticed in connection with the taking care of our steel cars.

Mr. Rodabaugh.—Mr. Quest says the flash should be taken off before it is treated with a sand blast; how do you account for it then that if you take two pieces of steel, and you take the flash off one with your sandblast and you coat it immediately after it is off; say you have your pot of paint there ready to coat it as soon as the flash is taken off; then you take a piece of steel out of the pile and paint it under different circumstances; you paint both of those pieces with the same kind of material at the same time, you hang them up outside where they can get all kinds of weather, and in nine or ten months there is not any perceptible difference in those pieces of steel. How do you account for that? If the flash must be taken off, if that is the cause of this flaking or whatever you may call it, why does it not do it on that?

Mr. Quest.—I do not think that any such test as that would be fair; if you expose those two pieces of iron on the end of a building, there is no chance for them to be abused in any way, and of course, the paint, being undisturbed, affords a protection to the uncleaned as well as to the cleaned sheet. But it seems to me the reason why the iron oxide should be removed, is that in case you strike the metal a blow, you have an abrasion there, then on the sheet that has the iron oxide or flash, there would be a stronger tendency for the water to get in there. That is the dross; it is something that should be removed. It is not the good iron. Consequently the percentage of liability is greater there than it would be on the other. It is not a fair test, I assert, to make any comparative statements in regard to that thing, although it will lead up to better results if those matters were taken up by everybody.

Mr. Laufersiek.—Is it not a fact that the manufacturers have all admitted that that flash should be removed, and the reason they do not remove it is because it costs so much money? That is the excuse they give for not removing it; they have been asked to do it.

Mr. Quest.—Several years ago, at the time of the first coming of the steel car, I was on a committee deputed to go around to the mills. I put that question to a number of manufacturers of iron up in the Pittsburg belt, and some thought that there would not be any trouble; others again thought it ought to be removed; the latter class were in the minority, but there was no way for them to remove it. There is a great deal of difference though in the run of iron, very often. Often times they will have a run of iron that there is not so much flash on as they have at other times. Certain conditions, I presume, control that.

Mr. Cook.—Mr. Rodabaugh's proposition suggests this question: would a general test of the character that he suggests bring the results that he claims? For instance, suppose you take a dozen pieces of steel and subject them to the sandblast and paint them immediately, and take a dozen pieces that are not subjected to the sandblast and paint them the same way, with the same material, and expose them to the weather—would there not be a much greater percentage of the material not subjected to the sandblast show the result in rust than of those that had been? Of course, you might take two pieces and you might accidentally get hold of a piece that had not much of this flash scale on, or at least it was in such a condition it would not rust. But I think if you made a general test of that character you would find that a very large percentage of the material not subjected to the sandblast would soon show evidence of rust.

Mr. Miller.—Mr. President, I think there is no chance for argument on the subject as to whether the scale should be removed or not. I think we are as a unit on that point—that better results will be obtained if the scale be removed. Any of us who have ever painted locomotive tanks are convinced of that fact. We have noticed that where the scale is not removed rust appears very quickly, and the result is that we have to remove the paint, get down to the bare iron and remove the scale, after which we are apt to have but very little trouble. I am surprised to think that there are dissenting members present, if such be the case. While I am on my feet I would like to state to the members of this association that our master car builder from the Delaware, Lackawanna & Western road, which I represent, is with us, and we would like to hear from him.

Mr. Rodabaugh.—I did not want to be understood that I did not think it was necessary to take the scale off, but I wanted Brother Quest to answer me that question, why there wasn't any difference in those two pieces of steel. I believe that the scale ought to come off, certainly.

Mr. Hartshorn.—Seventeen years ago I painted four shifting engines that we manufactured at our shop, and I want to tell you how I did it about the scale. Now, I claim it is not necessary where scale is solid and a part of the iron, to remove it. I merely took some sandstone and rubbed over that, and then, to get it more thorough and get into the hollows, I told the men to take some coarse No. 2 sandpaper and sandpaper it, and they did that; I looked it over and found some parts of the scale were starting on the tank; I told them to take a cold chisel and to cut that off. I painted those tanks and primed them with lead and boiled oil; I prefer that to raw oil every time, on engines; and those tanks have run thirteen years and there is not a crack, scale or anything, except knocks, on those tanks.

President Bruning.—Now then, please give us your formula for that. You say, lead and boiled oil. Now let's go into the details of that, because that does not answer the question. What is the formula?

Mr. Hartshorn.—The only thing I did was to give it about two-thirds oil and one-third turpentine.

President Bruning.—No dryer?

Mr. Hartshorn.—I put a little dryer in it, a very little, because I was hurried, and I coated on top of that two coats and rubbed it down, one coat a day.

President Bruning.—How long did you let this first coat stand?

Mr. Hartshorn.—Three days. It might have been four.

President Bruning.—This is useful information. Do you understand, gentlemen, he let the first coat stand four days. Now then, the second coat?

Mr. Hartshorn.—The second coat, I put on a coat a day, mixed the same way, just roughed-up, didn't give it any lead at all, ordinary rough-stuff. But this was a good, substantial coat of lead, you understand. It was not flowed on, it was brushed on. And that is all I have ever done to it except a flat coating all the way through, and two coats of varnish, and away they went. Now, I don't say, that I haven't cut them in, but the foundation has never been removed.

President Bruning.—You do not find any traces of rust whatever?

Mr. Hartshorn.—Not a mite.

President Bruning.—Well, that is remarkable.

Mr. Hartshorn.—And we do not get any engines on our road from the manufacturing shop but what in a year or less time they will begin to rust.

President Bruning.—That iron at that time was common iron? It was not the steel that they use at the present time?

Mr. Hartshorn.—Steel tanks; that is what they were.

Mr. Miller.—Did they use steel tanks in those days?

Mr. Hartshorn.—Yes, sir; steel tanks.

Mr. Dane.—I thought that this steel tank was a new thing?

Mr. Hartshorn.—I never had any trouble with lead on a tank in my life. I haven't had much experience in this business, but I worked forty years in one place and I never had any fault found with a tank that I had painted.

President Bruning.—There is another question I want to ask. We have different kinds of lead. Do you remember what make of lead this was that you used?

Mr. Hartshorn.—No, we get all kinds.

President Bruning.—That would be a very important matter, because there is a big difference in lead and the same in oil.

Mr. Hartshorn.—Well, I cannot tell you that because I don't know what we are going to get next.

President Bruning.—Was it English or American lead?

Mr. Hartshorn.—I claim it is more in the mixture than it is in the lead. It was American lead. There is nothing foreign about us. Now I merely tell that because they stood better than I thought they would.

President Bruning.—That is right. That is what we want to get at.

Mr. Hartshorn.—There has been some talk about removing all of the scale; I don't believe, where it is a part of the iron and solid, there is any necessity of removing it.

Mr. Jones.—I want to say that I think I do something similar to what Mr. Hartshorn says. I use white lead for priming gen-

erally, just the same as he does, but I put in a great deal of lamp black. I make it very dark.

Mr. Hartshorn.—I make mine very dark, too.

Mr. Jones.—Two-thirds of oil with one-third of turpentine, mixed that way, for the first coat.

President Bruning.—No dryer?

Mr. Jones.—No dryer.

President Bruning.—How long do you let that coat stand?

Mr. Jones.—I let that stand a day; and, as a rule, I just give one coat of black finish; knife it, rub it down and give it one coat of black finish later on and a coat of varnish, and when I get a chance and get the time, after cleaning all the rust well off—that is, for new tanks, I turn the steam into it; I get it just as hot as I can with the steam and give it a coat of oil—boiled oil. I let that stand at least three days, longer if I can, and then give it a coat of lead over that oil, then knife it with knifing fluid, rub it down and give it one coat of black finish.

I find the best results are from the first coat of oil. I get the tank just as hot as it is possible to make it with the steam; that is, after it has been cleaned. And that I find, from my experience, is the best method of painting steel tanks. But as Mr. Gohen said a while ago, I think if the steel could be coated after it had been passed through the rolls in the mill, that that would be still better because some other gentlemen have said, you come and burn off a tank and sometimes two or three years after it you will find those marks on the steel that was put on there in the mill.

President Bruning.—What will you do with this subject, gentlemen? I think it has been thoroughly discussed.

Moved and seconded that the convention take up the next subject.

Carried.

President Bruning.—The next order of business will be the Report of the Committee on Tests.

REPORT OF COMMITTEE ON TESTS.

PRESENTED BY W. O. QUEST.

Your committee on tests begs leave to submit the following report. The subjects selected and reported upon were not made by assignment, but by choice of committee.

Your committee greatly regrets that there is not a larger test exhibit for this occasion. The reports of test committee are usually looked forward to as reports that will attract the attention of everybody interested. The work of all test committees should be by assignment. A test committee should be a standing committee if the results sought for are to be realized, namely: reports with sufficient information to attract the attention of both the committeeman who does the work of making the test, and the members of the association who take only an interest in the specially assigned work of the association.

Your committee further states that, owing to the fact of not having the formulae key to the set of test panels handed to it by Mr. Bruning of the L. &. N. R. R. Co., for re-exposure, there will be no report on the same.

The following are the several test reports:

RED LEAD TESTS.

A series of red lead tests on steel cars and panels, done under the supervision of a representative of the National Lead & Oil Company of Pennsylvania, at the Pittsburgh and Lake Erie Car Paint Shop, McKee's Rocks, Pa., under the foremanship of a member of your test committee, who notified the representative that the method of making, and the results found, in said tests would be presented at this convention.

The red lead sample panels, Nos. 1, 2, 3 and 4, are submitted for your inspection without further comment. These panels are facsimiles of materials used on red lead painted cars now undergoing test to prove the claimed superiority of red lead as a protective coating over that of the iron oxide coating; which is also used and generally recognized by the painting world to be one of the best protective coatings for iron, etc.

The following is a copy of report of red lead test, sent to the office of company's Superintendent of Motive Power, on November 22, 1900:

"Mr. L. H. Turner,

Supt. of Motive Power.

Dear Sir: As arranged per your instructions, we placed several hopper bottom steel cars in shop, in order that the representative of the National Lead & Oil Company of Pennsylvania be given the desired opportunity of demonstrating the claimed superiority of an applied red lead paint over that of an applied iron oxide paint, where painting sheet iron surfaces.

This company furnished the skilled labor, dry red lead, oil etc., for the test. The paint applied was in accordance with this company's formula. The method of application was under the supervision of the National Lead & Oil Company's representative.

The three cars under test were cleaned down to iron, free of all old paint, rust and loose scale. P. & L. E. steel car No. 11994, out of shops November 14, 1900, was machine-applied two coats of red lead. It required six quarts of the red mixture for first coat, and five quarts for the second, the parts coated being only sides and machinery ends of car; the extreme bottom and inside parts of car were not coated. The total cost of material used for cleaning and painting car would be as follows:

To all cleaning, labor and material............	5.88	
To spray-coating, etc., 2 coats, 2 hrs. at 20c....	40	
To re-letter and number car, 2 hrs. at 17 1-2c....	35	
To 45 lbs. dry red lead........................	2.70	
To 2 galls. raw linseed oil at 70c. per gal....	1.40	$10.73

The cost of red lead painting P., McK. & Y. hopper bottom steel car No. 13533, out of shop November 16, two (2) coats with the brush would be as follows: charges for material and cleaning being the same as for car P. & L. E. No. 11994:

To all cleaning, labor and material............	5.88	
To labor, brushing on 2 coats, 11 hrs. at 17 1-2c.	1.93	
To 50 lbs. dry red lead at 6c..................	3.00	
To 2 galls. raw linseed oil at 70c..............	1.40	
To labor re-letter and number car, 2 hrs. at 17 1-2c.	35	
To 1 pint of turpentine........................	.06	
To 1 pint Japan dryer.........................	.13	$12.75

(Above car is represented by panel No. 1)

The cost of machine red lead painting P. McK. & Y. hopper bottom steel car No. 13522, out of shop November 17, 1900, one (1) heavy coat would be as follows:

To all cleaning, labor and material............	5.88	
To 6 qts. special red lead paint................	2.63	
To labor, machine coating, 1 hour at 20c......	.20	
To labor, re-letter and number, 2 hrs. at 17 1-2c..	.35	$9.06

(Above car represented by panel No. 2.)

Panels numbers 3 and 4 represent steel hopper cars No. 13516 and No. 13511, red lead painted with raw linseed and Sipe's Japan Oil.

The following is average cost of doing same work, two coats with machine and our standard iron oxide (semi-paste form) paint, mixed in linseed oil and Sipe's Japan Oil; cleaning, etc., cost same as preceding cars:

To all cleaning, labor and material............	5.88	
To 22 1-2 lbs. P. M. paint at 85c. a gal........	1.28	
To 15 lbs. Sipe's Japan Oil at 40c. a gal......	.76	
To 7 lbs. raw linseed oil at 70c...............	70	
To labor, machine coating, 2 hrs. at 20c........	.40	
To labor, re-letter and number, 2 hrs. at 17 1-2c.	.35	9.37

You will please note that car No. 13522 received but one heavy coat of red lead, the representative of the Nat'l Lead and Oil Company claiming that this *one coat*, as specially mixed and applied with machine, weighing 26 pounds to gallon, would afford a more perfect protection by excluding all air and moisture from surface of sheet iron than can be afforded by any two coats of iron oxide paint, regardless of how mixed and applied.

According to our past practice and experience, we consider that this *only-one-coat-red-led-claim*, savors more of assertion than of facts.

We would recommend that these test red lead cars be inspected at timely periods and a report made upon same. As the red lead paint used upon two of these cars was darkened down, but slightly with lamp-black, they can be readily located in train service for examination, and thereby discover whether the National Lead & Oil Company of Pennsylvania can make their claim good, that the red lead paint is the only preservative coating for the exposed sheet iron surface of the modern steel freight car which, up to the present time, according to the best of consulted authorities, is causing a great amount of trouble and expense from the fact that, through a lack of proper protection, a continuous corrosion of the iron is going on to such an extent that it has already become a matter of speculation with practical people, as to which will render the longest ser-

vice at the least expense—the modern steel car of to-day, or the old wooden standby of the past which, in instances, on an original painting with iron oxide, have lasted a service term of sixteen years. Yours truly,

W. O. Quest,
Foreman Painter."

In further reference to results found, from occasional inspection of these red lead painted cars, we find the material wearing well, but not enough better, at this date, for us to decide in favor of the red lead painted car versus the iron oxide painted cars, turned out at same time, which have also been inspected and found to be in equally as good condition as those done with the red lead oxide. We state here, however, that *we have been surprised at our failure to note the claimed continued elasticity of this applied red lead and raw linseed oil mixed paint.*

The results convince us conclusively that the claim made for red lead, as one of the strongest absorbents of oxygen, and for the continued elasticity of the red lead coating (which gives way, to both the expansion and contraction of the iron) is clearly, to our mind, more a matter of assertion than fact.

IRON OXIDE TESTS

Oxide of iron samples, mixed in various oil vehicles, were given an exposure on the eastern end of a round-house, close to straight track to turntable, thus being greatly subjected to exposure of severe weather, also cinder dust and sulphuretted smoke from the locomotives, the latter element being undoubtedly the most destructive to all paints, etc., from the fact of continuous deposit accumulation which authorities claim, soon assumes the strength of a sulphuric ammonia, the strongest and most destructive agent coming in contact with paint.

The iron oxide painted samples which are submitted for inspection, without comment, number from twenty to thirty consecutively.

No. 20—One part iron oxide, two parts Sipe's Japan Oil.

No. 21—One part iron oxide, equal parts Sipe's Japan Oil and cold oxydized raw linseed oil.

No.—22—One part iron oxide, two parts kettle boiled linseed oil.

No. 23—One part iron oxide, two parts Wheeler process drying linseed oil.

No. 24—One part iron oxide, two parts commercial boiled linseed oil.

No. 25—One part iron oxide, two parts lucol oil.

No. 26—One part iron oxide, two parts No. 1 lacquer oil.

No. 27—One part iron oxide, two parts of No. 2 lacquer oil.

No. 28—One part iron oxide, two parts Sterling Mfg. Co. XXX paint oil.

No. 29—One part iron oxide, equal parts Ball's oxydized and raw linseed oil.

No. 30—One part iron oxide, two parts Linhuile.

TEST PANELS SUBMITTED BY THE SOUTHERN PACIFIC RAILROAD COMPANY'S SACRAMENTO PAINT SHOP

The following is report of the test committee upon the several re-exposed test panels, originally submitted at Detroit Convention by Mr. W. C. Fitch of the Southern Pacific R. R., your committee only reporting upon this year's exposure, dating from October 1, 1900, to September 1, 1901, also giving materials and compound parts thereof, all of which are finally submitted for your inspection and judgment.

No. 1—Boiled linseed oil and Mexican graphite.
Condition practically unchanged.

No. 2—Boiled lucol oil and Mexican graphite.
Has lost a percentage of its elastic life.

No. 3—One-fourth raw linseed oil, three-fourths boiled Lucol oil and Mexican Graphite.
Considerably changed but still a protective coating.

No. 4—One-fourth raw linseed oil, one-fourth boiled Lucol oil, equal parts Mexican Graphite and lampblack.
But little changed in condition.

No. 6—Three-fourth boiled Lucol oil, one-fourth raw linseed oil and red lead.
Considerably less elastic after exposure.

No. 8—One-eighth pint of Pintsch gas tar, one pint of boiled Lucol oil, one-eighth lampblack, seven-eighths Mexican graphite.
Found to retain an elasticity that is still remarkable.

Not having balance of panels, Nos. 5, 7, 9, 10 and 11, as submitted at Detroit, your committee will not report on same, but trust that Mr. Fitch, in person, will produce and make report on same, as we were assured by that gentleman that his object in taking missing panels back to the Pacific coast was to further ascertain what effect another year of salt air exposure would have on these panels.

Your committee will make no further attempt to tabulate or to give component parts of the several other Fitch panels, which include a number of surface work exposures which, we have no doubt, would prove interesting if formula keys and the length of time they were exposed were known.

Respectfully submitted,

W. O. Quest,
T. J. Rodabaugh,
Frank Crocker,
Committee.

Mr. Quest.—Through some misunderstanding, the report of the Committee on Tests was given at the first session, and the committee report is of course already in, with the exception of the missing numbers of the Southern Pacific series of tests, which I am at this moment unable to select out, because the numbers I have already reported on, and if our report were here I would be able to select the missing numbers, because these are duplicates of the missing panels, as I understand (indicating). The reason why Mr. Fitch is so anxious to have this embodied in the committee report is the fact that this (indicating) has had some two or three years of salt-water test, and the other is, as I understand, for air.

Mr. Fitch.—Salt air?

Mr. Quest.—Yes, salt-air test; we might put it that way. Owing to the fact that I was a member of that committee, I examined the panels pretty closely over in Detroit, and so far as my memory serves me there is very little change in those panels, after having undergone an additional year's exposure.

President Bruning.—Mr. Quest, if you are fortunate enough to be retained on that committee I will furnish you the key to those samples that have been up six or seven years. They will be valuable next year.

Mr. Quest.—I assure you, Mr. President, it will be a very unfortunate occurrence if I am continued on the committee. I think I have had my share of this, and I would rather it be assigned to some other member. I think the proper thing to do would be to get the opinion of some other man on this.

Mr. Quest.—Do you desire to accept the report of the committee?

President Bruning.—Yes, a motion will be in order to that effect.

Mr. Gohen.—Mr. President, I move the report of this committee be accepted and the same committee be retained another year and report another year's progress on this. It is a bad measure to change the Committee on Tests.

Mr. Stroud.—I second the motion.

President Bruning.—Gentlemen, it has been moved and seconded that the committee's report be accepted and the same committee continued another year.

(The motion was carried).

Mr. Miller.—Mr. President, we have Mr. Canfield with us now, the master car builder of the D., L. & W., and we would like to hear something from him.

President Bruning.—Gentlemen, I have the pleasure of introducing to you Mr. Canfield, master car builder of the D., L. & W. Railroad. (Applause).

Mr. Canfield.—Mr. President and Gentlemen: I came in here as a visitor, to see what I could learn about the painting of steel cars. My friends, Mr. Paulis and Mr. Miller, seem to want to push me up to the front. Of course I am glad to be with you, and I am glad to see the interest that is taken in the painting of steel cars, but from the discussion here to-day, I am inclined to think that we do not have to pay much attention to the outside of the car. I believe we can take care of that with very little trouble. With the inside of the car I like the suggestion of coating them over with oil occasionally. I doubt very much whether we would have to do that every trip, probably once a week would answer. I think, too, the secret of the success of that car will be in loading it and unloading it promptly—keep it in service all the time. Don't let it stand with a load of coal in it or long after it has been unloaded. I think the action of the coal passing in and out of the car will keep the corrosion

removed. I doubt very much whether we will need any paint on it or will find any paint that will remain on the inside, but the coating of oil looks to be a good idea, and I think when I get home I will try it. I have only a hundred cars, so I haven't very many cars to bother with yet; we are just starting in to go over them now. I heard one gentleman say that 18 months of rust amounted to .79 of an inch. Is that right?

Mr. Quest.—Yes.

Mr. Canfield.—According to that, if it goes on rusting in that proportion, we do not need to paint very much; they are going to last a good while anyhow. I thank you, gentlemen. (Applause).

Mr. Gohen.—I move a vote of thanks be tendered Mr. Canfield for his presence here. We are always glad to see the master mechanics and master car builders, because we feel that when they come here they are taking an interest in our association and an interest in their own business, and when one of them does come here we certainly do feel thankful for his presence. I move you, sir, that a rising vote of thanks be tendered Mr. Canfield for his presence here to-day.

Seconded and unanimously carried.

President Bruning.—Gentlemen, there is a very important matter that comes up now, and that is the "*Car Cleaning Tests to Be Reported at the Convention.*" The first paper is by Mr. W. C. Fitch, of the Southern Pacific Railway, Sacramento, Cal.

Mr. Fitch's paper is as follows:

REPORT BY W. C. FITCH.

I was notfied by our secretary that I had been requested by our president to make tests of terminal cleaning, as a representative of California. I have made tests to some extent, but not as thoroughly as I would like to have done.

This matter of terminal cleaning is very likely the most important one ever before this association, when we consider the very large amount expended for this work each year. We also know that this cleaning cannot be made better unless railroad managements become willing to spend more money upon it. No doubt a part of it at least would be returned in the prolonged life of the paint and varnish, and a part ought to be considered well spent if it betters the appearance of the cars.

Cars are painted for two purposes; first, to protect them from destroying elements, and, second, to enhance their appearance. If the latter was not a prominent consideration, they might as well be painted like freight cars, and receive a cheap coat every year or two at a cost of a few dollars. When cars leave the paint shop they are really a thing of beauty, with their clean paint, gold leaf, and bright varnish. It should be the object of the management to hold it in this condition as long as it can be done at reasonable cost. But alas, the difference! It is put into service very likely when the varnish has been but a few days on it. It runs a trip or two and is taken to the yard for cleaning——and how is it done? Hose and two men and the cleaning begins. First comes the man with the hose, following him comes a man with a brush. The man with the hose puts the water on the car and the man with the brush follows, scrubbing dirt, cinders, etc., into the varnish. Then the car is rinsed with water and left to dry in the boiling sun; the water collects in streaks and drops carrying more or less dirt with it. When the water dries off the dirt is fastened to the varnish leaving dull unsightly spots and streaks; this is repeated often until the beauty of the varnish is gone. Now, before we go to any of the new fangled methods of cleaning, let us talk of what should be done in the above case. Do just as any owner of fine carriages and hacks will do. After the car is thoroughly cleaned with water from the hose, sponge it off and chamois it dry before it has a chance to dry without it. This and nothing more. Do this a few weeks after the car leaves shop or until the varnish has become hard so that it will not easily spot, then return if you must to the old method of hose and scrubbing brush. This method of cleaning the car need not cost much for a month or two and it will add to the appearance of the car, if it is not done again while in service before being shopped. As I understand it, this extra terminal cleaning, we are considering, is not expected to be used until the car has been in service for three or four months. If cars were washed as above mentioned and a little soap used on soiled spots and smoky ends once in a while, I do not think that there would be much need for the extra cleaning; but, inasmuch as they are not cleaned in this way, or not likely to be, we will look for other means for cleaning them. We are looking for an improved way at about the same cost as the *new* old way, for really the old way is with chamois as above mentioned (and it was not discontinued because it was not a good one, but because it was thought to be expensive). Hence we have been asked by the Master Car Builders' Association to make trials and tests of terminal cleaning for the purpose of getting at some improved way at about the same cost. Will we get it? I do not think the method can be improved without additional cost; but if the consideration of additional life of paint and less rotten sash, battens and many other parts of the car are to count in favor of the new way, it may be done.

First of all I would use but little water in comparison to what is now used, but would do more wiping with dry waste. Dust off the car and then wipe off with clean dry waste and see how well it will look, barring a few soiled spots now and then that may need sponging off at times. Of course the car should be washed occasionally but should be chamoised at the same time. Take this method of cleaning cars and compare it with the method now in use of driving water from a hose at a pressure of from ten to forty pounds, into every crack, crevice and open joint in body and sash and see how much better condition a car will be in, in paint, varnish and wood work after the car has been in service for one year or more. The very fine dust left on a car after dusting will not injure the varnish when wiped with waste, and will have a tendency to polish and brighten the varnish. The wiping with waste need not be done but once or so a week, as a good dusting every day or as often as convenient will do for other times. This method I would adopt after car had had a chamoising process for a month or more as above mentioned. Probably a somewhat different method should be adopted for head cars, and for which I think I have found a good cleaner.

I wish the gentlemen of the convention to understand that I am giving my views from the climatic conditions existing in the various States and territories through which runs the line of road with which I am connected; so now please criticise me from this point. Now for my tests with new terminal cleaning:

I wish it understood that the present method of cleaning cars on our road is about the same as on most roads, viz., water, hose, brush, scrub, rinse and left to dry without wiping. My first test was made on a baggage, mail and express car which runs next to the engine and makes a run of 272 miles per day. This car was cleaned in above way from December 15, when it went into service from the paint shop, to April 9, at which date it was very dirty, smoky and somewhat greasy. It was cleaned April 9 with American cleaner in this way: the cleaner was applied by two men with long-handled brushes from the ground, going over one side of the car at a time, the first man putting the cleaner on with a soft brush and the second following with quite a stiff brush, scrubbing the car thoroughly, after which the water was applied from the hose, the second man following with a brush, brushing the car thoroughly again. After this the whole side of the car was rinsed off with water, thereby removing all the cleaner. This process was continued on the whole car, and all dirt and grease was removed from the car. After the car was dry it was thoroughly wiped off with dry waste. This removed a certain amount of fine material that the water did not remove and renewed the varnish to a certain extent. This wiping with waste might have been omitted and yet the car would have had a very clean appearance; yet the wiping will improve the car very much if there is any glosss on the varnish. This cleaner will not add to the gloss of varnish, but it will not take from it. This left the car without any oily or sticky substance on it, consequently on its return trip all dust could be removed with feather dust brush. This car ran three months, after which time this treatment was repeated; the car was in a fair condition at the time of second cleaning. After first cleaning and up to the time of doing the second cleaning the car had no water upon it. It was dusted six times a week and wiped once a week with dry waste. The varnish is in a bright condition and the car at this date is fairly clean. We have used this same cleaner or one of about the same kind on about twelve head cars and some coaches. Some of the head cars were so dirty that the striping and lettering could hardly be seen, some of them having been in service for a year or more, and in each case the dirt and grease was most effectually removed. In some cases the car was wiped with dry waste; in other cases, where the varnish had no gloss, they

were not. In none of these did we use any renovator after cleaning. In using this cleaner, if car is very dirty, it sometimes may be necessary to apply a second coat of cleaner, but this should be done before the first coat is washed off. After cleaning with this material, as I said before, the dirt and dust will not stick to the paint. Cars after this cleaning can be washed off with water if so desired. I cannot see that this cleaning injures the varnish and paint in any way up to the present time, and do not believe it will, if it is properly cleaned off. The time consumed in cleaning cars with this material will not average over three hours per car to do the washing with the cleaner, and if wiped with waste, about two hours more may be added. The amount of material used would average from one gallon to one gallon and a quarter. This cleaning on head cars need not be done oftener than once in two or three months. I think this the most practical cleaner I have found, especially for head cars.

I have made several tests with emulsion or oily cleaner, using four different kinds, three of which appeared to do about the same work, requiring about the same amount of labor, which would run from eighteen to thirty hours per car, according to the size and condition of the car. In each case the cleaner did good work as far as cleaning was concerned, and in each case the cars were thoroughly wiped with waste, removing as much of the cleaner as possible, but in each case the car came to terminal on its return trip thoroughly coated with dust, two kinds of the cleaner not quite so bad as the other two—but all thoroughly coated. This dust could not nearly all be removed with dust brush, but could be removed by wiping with waste, yet it required quite an amount of labor to do so, as the oily matter had oozed out from open joints and cracks in beading, etc., and this had to be carefully wiped out. It was necessary to repeat this operation on several return trips of the cars before the dust had absorbed all the oily matter. Since these cars were cleaned no water has been applied—nothing but dusting and wiping with waste; consequently the varnish is not perishing as fast as on cars washed with water. This cleaning has been repeated on but one of the cars cleaned with this material. In each case cars cleaned in this way look very bright and clean before going into service, but I cannot say that they look any better now than cars done with the other cleaner mentioned. These emulsion cleaners in the hands of inexperienced help would cut a sorry figure no doubt. I am not prepared to say it will not be successful if properly handled. For special cars that get special care after cleaning it may be successful, but I believe it to require too much labor and skillful handling to ever become the universal cleaner. I hope to learn much about car cleaners before this convention adjourns, at least there is no doubt I will hear much about them.

About three months ago we cleaned three dining cars with emulsion cleaner, since which time two of the cars have been re-painted and the other was re-varnished; I found no trouble in any way in varnishing over this cleaner, and could see no difference between it and other cars varnished, as far as the working and drying of the varnish was concerned.

I believe the successful cleaner will be one that can be applied with brushes from the ground and washed off with water, and one that can be handled by ordinary car cleaners without endangering the paint or varnish; one that does not contain any oil or grease to catch the dust and smut. I have seen many cars that have been cleaned with emulsion cleaner and in nearly all cases they were coated over with dust and dirt that had become thoroughly fastened to the paint. I have cleaned some of these cars with terminal cleaners, and found great trouble in getting the material off.

When terminal cleaning is done with less regard to cost and more for the appearance of cars, improvement will be apparent —and not until them. When that time comes, there will be many ways in which it can be accomplished.

Mr. Clark.—I wish to know, Mr. President, whether this successful car cleaner, if left on there, not entirely cleaned off, would ultimately dry hard, or whether it would still remain in a soft state?

Mr. Fitch.—If it was not washed off?

Mr. Clark.—Yes, if some of it was left there.

Mr. Fitch.—If some of it was left there I have no doubt it would endanger the varnish to some extent. I think any of these cleaners would do that.

Mr. Clark.—Would it dry hard?

Mr. Fitch.—I don't know. I have never left it on. But it should not be left on. It should be washed off.

Mr. Clark.—The point I want to make is this: A cleaner of that kind, if left to dry on (should this material dry hard), would form a coat or thin film over the dirt, and that dirt could never be eradicated when the car came into the shop for painting afterwards.

President Bruning.—We cannot discuss this question until we have read these papers. There are seven or eight papers to be read, and then we can have full swing. The next paper is by Mr. Gohen.

Mr. Gohen.—Mr. President, at Cincinnati I was asked if I would supply a paper on terminal car cleaning. Of course, I gladly acquiesced—said I would. I had made all arrangements, and in fact had begun this series of tests about the 1st of April, thinking that I could carry out the tests successfully through the summer months on the same cars, but before thirty days I found that there was such a general change in the make-up of these trains that I had started upon, consequent upon new trains being put upon the road for the Pan-American Exposition, and the cars which I had intended to keep under personal observation had drifted off into other channels, that I came to the conclusion that it would be foolish for me to attempt to make any test other than one under my own immediate supervision, so I thought I would leave it to the rest of the members who had probably better control of their cars during this season than we had, but I should be glad, after these papers are read, as I believe I have had a little experience in car cleaning, to give you the benefit of my experience in that line.

The President (Mr. Dane in the chair).—The next paper will be by Mr. C. E. Copp.

REPORT ON CAR CLEANING TESTS.

REPORT BY C. E. COPP

My first impulse was to decline my appointment on this committee for the good reasons that my headquarters are 26 miles from a terminal cleaning point, and I have nothing directly to do with this work, which on the B. & M. System is still carried on with the long-handled brush and water. I have since wished I had declined. However, I showed the secretary's letter to Mr. Chamberlain, our Master Car Builder, remarking that I guessed I would decline it. "No," he replied, "stick to it and I'll help you out." That's the kind of a man he is, as most of you know. I wish every member had such a friend to this association to help him out.

Well, I "stuck," and for the first two months—April and May, got more than stuck in the down-pour of rain and mud with which this section was noted. In April, there were four fair days, and seven in May. At last, to get started, I got a Fitchberg car into a small repair shed at Charlestown out of the pouring rain, and waded among the tracks there April 24, in company with one Samuel Brown, and began with "Cleanola" on the half of one side, and Brown's "Elixir," or whatever he calls it (the baby was not then named and may be now gone with cholera infantum, for all I know) on the other half of same side; and, as true as you live, this Brown's cleaner that he has recently gotten up and not on the market that I know of, did "hoe" the "Cleanola" "a pretty good row," to use a farmer's phrase. On the other side of the same car (which was No. 338) I used what is termed "Thorospeed," and, judging by the way it boiled when it was poured into a galvanized iron pail, it was, for this reason, at least, rightly named. But when it had gotten the galvanizing all boiled off the inside of the pail up as high as the liquid came in it, and got quieted down, we went at the car and did a fairly good job with it in less time than with the other cleaners on the other side of car; but the strong muriatic acid with which it was evidently charged condemned it in my estimation as unsafe for men's hands and the varnish, if constantly used. This car was afterward dry-wiped occasionally and was seen by me May 21 and dry-wiped on the "Thorospeed" side, and on the other side with waste moistened with each cleaner respectively. It has now and then been dry-wiped since, and at last accounts was in good condition, though running through five miles of Hoosac Tunnel a part of the time. I made no attempt to time the trial of these cleaners as they were new to the men and mostly to us all.

On May 22 Rattenbury's cleaner was mixed, as per formula received from Secretary McKeon, and tried on combination car 1976 on one-half of side and "Cleanola" on the other half. It was a very dirty tunnel car about six months in service with the letters and striping hardly discernable. I did not have much success with either cleaner on this car, though Rattenbury's cleaned faster, so the car was shopped at the Somerville shop and Mr. Worrall finished it, first cleaning it with a mild solution of soda. I cannot say at this date that I am at all "stuck" on Brother Rattenbury's decoction, or any other containing acid, or black, mixed with it. There is black enough on our cars, especially those that run through five miles of Hoosac mountain, without putting on any more to help clean that off. And as for acid, let the tinsmith have it to do his soldering with. Men do not want it under their finger nails, and I don't believe we want it on our varnish.

Many cleaners have been tried since on various cars—so many, in fact, and so new to the men, that I have not felt that speed contests amounted to much. I did, however, clean one large passenger coach in July that had been seven months in service and was very dirty; one half of it, center to center, both sides, with "Cleanola," which took eleven hours labor and one gallon of material, and the other half with "Modoc," which took 13 1-2 hours labor and one gallon of material. Of course this was a large amount of labor, but the work was new to the men, yet it was cleaned, not greased over, as is the case with too much of this work. As the car was in for new trucks we had an opportunity to watch it for a week or so. On the "Modoc" end the surface was streaky, greasy and sticky at the time of leaving the shops; but on the other end the residue of "Cleanola" had evaporated more perfectly, leaving a comparatively dry, smooth surface that would not collect dust or dirt. Both were wiped off equally as dry as possible.

More recently I have conducted tests on two other coaches. On one-half of one, as in the case above referred to, "National Car Wash" (2 gallons and 9 hours labor) was used, and on the other half "Cleanola" (1 1-2 gallons and 7 hours labor). At the time of leaving yard, a few days afterward, the half cleaned with National Car Wash presented the brightest appearance, the Cleanola having evaporated somewhat more than the other, leaving the surface more dead.

On still another car, later, the "Banner" cleaner, the "A. B. C.," "Brooks'," and "Cleanola" were put in competition. On one side the Banner and A. B. C. had a half side each, with two hours labor and one gallon of material to the former and one-half gallon material and three hours labor to the latter. The other side of car, in same manner, had Brooks' one gallon and 2 1-2 hours labor, and alongside of it on other half, A. B. C. one-half gallon and 2 1-2 hours labor. On the ends Cleanola, 1-2 gallon and 3 hours labor, was used. As the result of this test the Banner and A. B. C. were condemned in my mind on account of the acid in them and its effect on the men's hands and on the varnish, which latter was turned white in spots wherever the Banner cleaner struck it in drops as it fell on the trestle and spattered on the body of the car below where they were cleaning. The A. B. C. turned edges of moldings and beads white and, though afterward the Banner was dressed off, as it had to be, with Brooks' Renovator to restore the deadened surface, the spots still showed as plainly as before. And likewise in the case of the A. B. C. The Brooks cleaner has such a cutting effect upon the varnish that I cannot say anything in its favor. I herewith submit to you some samples of old car moldings that I stood in as many tin cups containing eight different cleaners for 42 hours, and the results you have before you. One of them, the worst of all, did not stand only about half as long. It would start the varnish in thirty minutes by my watch! I was advised to write to this party to ascertain if a mistake had not been made and a varnish remover sent in place of a cleaner. A pint of it was received, which separated into three distinct parts by standing in a bottle a short time, the bottom (about an inch deep) being soap, which would, in one night, remove 25 or 30 coats of paint and varnish! And this was said to be the invention of a painter as something to clean with so as not to injure the varnish!

Now, gentlemen, I ought to have but little more to say, for I must have already wearied your patience. Suffice it to say that I have conducted these tests as fairly as I knew how without fear or favor, and as far as my limited time and opportunities have allowed me to arrive at a conclusion, it is clear in my mind that the honors are between "Cleanola" and the "National Car Wash." This is much against a preconceived opinion of the latter material, at any rate, as by a superficial examination of it I did not take to it. But "the proof of the pudding" is said to be "in the eating." Considering the price, doubtless the latter would receive the most favor as an article for extensive use at large terminals. However, the price aside, I would much prefer Cleanola as the ideal oil cleaner, with nothing unpleasant about it to the sight, smell, or to the hands, and withal a good article to use on the interior of cars to clean and renovate them with when not needing varnish, especially if varnished the previous year. Much surface can be wet with it and left to soak and soften before scrubbing and wiping off without fear of injury to the varnish.

As to acid cleaners, I do not think I should want to use them.

I have no apology to make for the use of names of cleaners in the foregoing, for that matter was settled spiritedly some time ago when, I believe, I had the honor of occupying the chair. It is no use to be forever "beating about the bush," if we would be of any benefit to the roads who employ us and send us here. The time has come to "speak out in meeting" what we have found out, and if a party has not succeeded with an article for a cleaner, let him try again. Things must stand on their own legs if they stand at all.

The President.—The next paper is by Mr. Rattenbury. He not being here and not having any paper here, I will call upon Mr. Putz.

Mr. Putz.—Mr. President and Gentlemen: My health has been so very feeble for the last year that it has been almost an impossibility for me to make the tests as I ought to have made them, and therefore I have prepared no paper. Another reason is that I have nothing to do with the terminal cleaning of the cars. Our shops are located in the center of the road, and we have nothing whatever to do with the terminal cleaning. Now, in the tests that I have made in cleaning at the shops themselves, I find this: That soap and water is the quickest way of cleaning; then afterwards, if it is necessary, I find that an emulsion preparation will do very well to lengthen the life of the varnish, to some extent. I do not know that it will lengthen its life to a very great extent, but it will to some extent; and it will take a little longer to clean with the emulsion cleaner than it will with soap and water. On the inside of the car I like the emulsion cleaner very much, because it brightens up the varnish and gives a good result generally. I think that is about all that I have to say on that subject, and you will excuse me for not speaking any more, because I am very weak. (Applause).

The President.—Is Mr. Glass in the room? Mr. Marsh?

Mr. Marsh then read the following paper:

REPORT BY W. L. MARSH.

I hereby submit my report on tests of terminal car cleaning with oil emulsion, cold water and with water and soap.

I find that cold water alone will not remove the dirt and greasy smoke that comes from the engine. "It is like pouring water on a duck's back."

In using soap and water, it will require men that are experienced in that kind of work. If the soapy water is left on too long, it will eat the varnish. Soap and water cannot be used successfully, out in the hot sun, for the reason that the heat will drive it into the varnish.

Our road has a train of two coaches and one baggage car, that was painted and went into service on the 10th day of last April, and has been running constantly between Atlanta, Ga., and Selma, Ala. I have used only cold water, sponges and chamois skins to clean these cars, and they are in such a condition that I will either have to clean them with soap and water or an oil emulsion. We have four vestibuled coaches that have been in service for eleven months, which have been cleaned with an oil emulsion, and the varnish is in good preservation.

I do not want to advocate soap and water for cleaning the varnished surface of cars; it is, however, good for other purposes, such as the interior of cabooses.

I have brought to the convention three test boards that have been exposed to the weather on the south side of our paint shop since the 1st of April. On two of them I used oil emulsion, and on the other soap and water. I also have a piece of siding taken from a coach that was in service for twelve

months, and the only cleaner that was used on the car was oil emulsion.

I have come to the conclusion that a good oily emulsion is the best for cleaning coaches at terminal points.

The President.—Is Mr. Beyer in the room?

Mr. Beyer.—Mr. President, I have no paper, and I will make only a verbal report. I have had only one car cleaner, that was the Modoc cleaner. It has given perfect satisfaction; therefore I did not think it was necessary to test it. I have never had any bad results from it, and I made no tests at all.

The President.—Is Mr. Cowan here?

Acting Secretary Cook.—Mr. Cowan is not here, but I have a letter from him, which I will read.

The following is Mr. Cowan's letter:

Montreal, September 10, 1901.

Mr. A. J. Bruning, President.

Dear Sir:—I regret very much to inform you that I will be unable to attend the convention, as I have been kept so very busy all Summer in getting the royal train ready for the use of the Duke and Duchess of Cornwall and York.

In reference to the emulsion cleaners: I have used the National, Marvin's, Modoc and Ko-Ko Cream. The cost of cleaning cars with these compounds is a great deal more expensive than it is with water, and requires more labor; but I find that when cars are taken into shops they are in much better condition than those that have been cleaned with water.

I regret very much that I am unable to submit a more complete report, but owing to the excessive amount of work on hand, I had not sufficient time to devote to the test.

Of the different cleaners that I have used, I find that the Modoc and the Clarence Brook are the best.

When you are passing a vote of sympathy to the President of the United States in connection with the dastardly and outrageous act of cowardice on the part of the would-be assassin, kindly count me just the same as if I was in attendance. The people of Canada sympathize with our American brethren in their present trouble.

Yours fraternally,
Thomas R. Cowan.

The President.—That closes the list, gentlemen. The subject is now open for discussion.

Mr. Fitch.—Mr. President, I must say that I am astonished to see that there are no more papers on this subject. It has been such an important subject before this association, and as we were asked by the Master Car Builders' Association to take it up, I am really astonished that there has been no more interest taken in it. When I received a request to make these tests I submitted it to Mr. Gilbert, our assistant master car builder, who is our acting master car builder, and he gave me permission to go ahead and make such tests as I wished, and he issued orders to the different points where I was to make those tests—gave me permission fully to go on and do the work. I did so as far as I could, in the time that I had to do it. Like Mr. Gohen, I had some trouble in making these tests, because I am situated about ninety miles from the prominent terminal of our road, and the cars that I could get to clean did not have such long runs as on the overland train that runs to Ogden and to New Orleans; but I made good square tests, and a few were made at terminals. I am really sorry to think that there hasn't been more interest taken in the subject. I may have some more to say on the subject when others have discussed it.

President Bruning.—Gentlemen, this subject is open for discussion. It is a very important matter.

Mr. Brown.—Some time early last Fall, at the New England Railroad Club, terminal cleaning was to be a side issue after the regular business was over, and Mr. Copp asked me to be present and listen or try to say something, and so on, and as I entered the room, I said: "Charlie, I think I have got a car cleaner." Many of you well know that a dozen or more years ago a question was submitted to this body; that is, the care of cars while in service; that is the origin of the terminal car cleaning today; and I set about at that time to investigate the matter. When Mr. Copp called me up to the New England Railroad Club he said he believed I had given birth to a cleaner. I certainly thought that I had found a material that would remove the dirt, and then I went on further to see how much damage it would do, and I will tell you later on. I had been a devout inquirer and a searcher after a material that would clean and not injure. Mr. Copp had put me next door to the Cleanola. I beg your pardon, gentlemen, for using the pronoun "I," but I am obliged to do it or I wouldn't. I find I can go the Cleanola one better; I can take a berth front which is smeared and smooched, and with my preparation I can clean that smooch off and polish your berth front. I have been unable to do that with Cleanola or any cleaner on the market. I was not appointed on this committee, and I should not have accepted if I had been, and I am not here to tell you how quick I can clean a car, or the different materials, but I have samples of little pieces of battens of four or five different panels which have been immersed in different "cleaners"—some one suggested they were wrongly named; should have been called "paint removers." Some of them take a little longer than others, but they will all remove the paint. I have three pieces which were immersed in the cleaners. I wanted to test and to see whether there were any injurious properties in these materials before I put them onto a car. Three of those, after forty-eight hours' immersion, are bare wood. I let them remain in forty-eight hours; they commenced doing their work earlier than that. One of them was in five weeks; at the end of five weeks the paint was removing. In a little phial of this material that I kept, I stuck a piece of a batten, and where the oil preparation appeared at the upper part or the middle of the little piece of wood it had not disturbed it at all, but down at the bottom, where the alkali—or whatever it might have been—was, it has started the paint. And now I have got to use that "I" again. I have had a piece of wood immersed in the material, that I was fortunate enough to discover, from the 27th day of last November until the 1st of August; the 1st of August I took it out of that little jar and took it to my home, hung it on the south side of my stable, and it hung there until last Sunday (September 8th). I wanted to demonstrate whether the action of the weather the balance of the time would discover that there were any injurious properties coming from it in that way, and I have failed to find that it has injured it in the least. I have got to the point time and time again where I must resort to an alkali in order to accomplish the purpose, and the moment I came to that point I stopped and waited a while. My material hasn't got a name. I was bound to wait until I was perfectly satisfied, and wait until the child was nearly a year old—in fact, it hasn't been named yet; I don't know that it ever will be. But yesterday my good friend Gohen, and one or two others, said that the proof of the pudding was in chewing the string. Gentlemen, I brought that string with me—he didn't have it yesterday—and it is tied on the little piece that I have strongly referred to. There is the short piece of string (producing small piece of wood to which a string is attached). That piece of batten was taken off our Bay State train that was built and put in service one year ago last June. These other pieces, gentlemen—there are three of them that were immersed in the various cleaners; I left them in there 48 hours, one of them five weeks, and that five weeks' fellow is the one I am up against. My preparation will clean as quickly as any of these materials. I do not claim that it is a quick cleaner, but I do claim that it is a very slow destroyer.

President Bruning.—We would like to have those samples left on the table here for the inspection of the members of the association.

Mr. Brown.—Most assuredly; yes, sir. You will all remember the little piece with the string. (Laughter).

President Bruning.—Well, Mr. Brown, there would be no impropriety in your marking those samples. This gentleman here has these all marked. These are all marked; you might as well mark yours.

Mr. Brown.—Well, they are marked. There is an initial letter on each sample. "M." stands for Modoc, "N." for National, "L." for Lightning, and "C." for Cleanola. The little string stands for what I have told you.

President Bruning.—You haven't got any shellac mixed in that, have you?

Mr. Brown.—No, sir.

Mr. Miller.—Will varnish crawl on it?

Mr. Brown.—You mean to spread some of that on a panel and then varnish it immediately?

Mr. Miller.—No, not immediately.

Mr. Brown.—All cleaners must be thoroughly removed. There is a method of removing that oily substance that can be done

practically in the last wiping. In wiping a car that has been cleaned with oil you must pass over it two or three times in order to get it off. I suggest that in the last wiping, a powder of an absorbent nature be sprinkled on your waste, on the same principle that you would clean up a piece of polished work. That will aid largely in absorbing the moisture. If it is a dark color you can use raw umber or something of that nature; if it is a light car, why a dry stone ochre or something of that kind will aid you, and it does not show any very bad effect. I have tried it, and it helps largely in absorbing the matter.

Mr. Cook.—I wish to give a little bit of history that is as yet unpublished. It simply verifies what has been said here. Last year, before going to the Detroit convention, I had a half dozen different cleaners in my office, and I submitted some battens to the same tests, and I took those pieces with me to the Detroit Convention, but something was said during the discussion of this question which made me feel that the time had not yet come for me to present those strips to the convention for the inspection of the members. I merely recite this to verify the experiments that have been spoken of here to-day. Some of those cleaners took every particle of paint off the battens, and I will only say that Cleanola was the best by far of any of them.

President Bruning.—Does any other gentleman wish to say anything on this subject? Mr. Dane, will you take the chair? I wish to make a few remarks on this subject. (Mr. Dane takes the chair).

Mr. Bruning.—Mr. President, I have made a test, in the last year, of car cleaning. In our terminal at St. Louis I have used different car cleaners, but some of them I have used in connection with an acid. I have two cars running out of St. Louis that run through the tunnel twice a day, one of which has been cleaned with an emulsion cleaner in connection with this acid, the other car I cleaned with a different cleaner. The car I cleaned with this particular cleaner and the acid looks fully as well to-day as it did last October. The numbers of those cars are 844 and 829. Last Fall they ran on the Florida Limited; at the present time they run in connection with the Chicago train to Florida. They pass through the St. Louis tunnel twice a day. Those cars are there for anybody's inspection. I notice there is a sample here of that cleaner, and I am a little surprised at the result on this batten here that has been immersed in that cleaner. My cars—I say this without fear of contradiction, the cars are right there for anybody's inspection—look fully as well as they did last Fall, with the exception of this one car that we went over with soap and water, and then we tried to rub it up with this car cleaner. I wanted to see what effect soap and water would have on it.

Mr. Brown.—Mr. Bruning, may I ask you if you allude to any of my samples?

Mr. Bruning.—No.

Mr. Butts.—Mr. President, I came into the hall this morning without anything to say on the car-cleaning subject, but, like some others, I am so vitally interested in the subject that I cannot keep still. In the last two and a half years I have tried every car cleaner that I could possibly find had any merit at all. I have been testing them conscientiously, with only one object in view, and that was to find the best, and I have had a chance, I think, to make exhaustive tests from a practical standpoint. I do not care to name any cleaner here; I do not want to advertise any man's cleaner; I am not in the cleaner business myself; but I have arrived at this conclusion, after a long series of tests: Any substance which is soluble in water, that will remove the dirt deposit on a car from smoke that comes from a locomotive, is injurious to that varnish. I cannot remove the dirt from the surface of a car with any substance that has either acid or water in it, but what in time it will do damage. I have found that the one that did the least damage of all was an acid cleaner. I have stuck to that because I have found it the best and have used it, and have had good results from it, but I will say positively I was never satisfied. I am of the opinion that there will be an oil emulsion cleaner on the market some time; I believe it can be made, and I believe somebody will make it, that contains no water whatever, that can be put onto the surface of a car and remove every particle of the dirt, and, in removing the dirt, take off all the substance of every kind that has been deposited upon the surface of the varnish since it first went into service. Varnish is more or less tacky the first week or two after it goes into service, and picks up dust, cinders and dirt of various kinds, which retard the dry wiping. Now, if you can clean the surface of that car and remove all those substances and make that surface of the car smooth, you have gone a good way toward putting that car in condition where it can be dry-wiped, which I believe is the only process to pursue thereafter, and make your car look well after it is dry-wiped and save labor. I have recently been making some tests with a cleaner that I think does that. The car is very much smoother after it is wiped (after it is cleaned) on account of its having a powder in it that does not cut the varnish. There has been an erroneous idea that all of us have entertained that we could not clean the surface of varnish with any powder that would cut the dirt off without damage. I believed that myself for years. I do not believe it any longer because I can prove that I can clean the surface of a car and remove every particle of the dirt and improve the condition of that varnish and prolong its life by using a certain powder. But I believe that dirt remover should be made with just a small amount of oil; I am not in favor of a remover that contains a large amount of so-called non-drying mineral oil, and yet we cannot get away from it entirely. I have found out by experience that every cleaner that contains a drying or a semi-drying oil will have this result. I think my friend Brown has used his cleaner where he has had skilled labor. You can take linseed oil and dilute it and put a little powder into it and do a beautiful job of cleaning, do your varnish no damage, but turn that loose on such a system as we have, and put it into the hands of the crudest laborers on the road, and they will perhaps get a car that has to be cleaned and got into the train in two hours—what are you going to do? The car looks nice after you have rubbed it a while and wiped it off hurriedly, but in the cracks and crevices there is a small amount of semi-drying oil left. Let that run until it dries; you will possibly not get that car for a month, and then see what kind of a looking car you have. You have a car that you couldn't clean with anything. You have ruined it. Consequently I couldn't nor wouldn't think of using a non-drying oil or semi-drying oil in cleaning cars. I claim it can't be done successfully without going to so much expense that it would condemn it immediately. We can't clean our cars at the shop with skilled labor. We have got a system that cleans every car on the road once in three months, and they are cleaned with common labor. We must have a substance on those cars which if it is not all removed when we clean a car hurriedly, that when we get hold of that car again it must be cleaned easily with a piece of dry waste. If you can do that you have got something that will be a benefit to you. The substance we are using now contains no water, no acid, no soap whatever. We can clean a car with that and put it into service and let it run three or four or five trips perhaps before we get hold of it—

President Bruning.—Didn't you say yesterday you used an acid cleaner that had acid in it?

Mr. Butts.—I said I had used it. We have recently commenced to use another, very recently too, and we are still using some of the acid cleaner yet, but we are going to discontinue it.

President Bruning.—You had good results from that, though, had you not?

Mr. Butts.—We have had good results from that cleaner, and if we couldn't get a better one we would continue it to-day. After my car comes back with the substance I am speaking of now, it has picked up a certain amount of dust, but the dust does not adhere to it at all. You could take your handkerchief and put it onto the car and without any pressure take off every particle of dust as easily as you could take off the dust that would naturally accumlate on a plate-glass front down here in the street. After this removing of the dust, this first time, you have a car that you can dry-wipe easily. I am going to say something that you will all doubt probably. I have several cars running now; one of them has been painted seven, one of them has been painted eight, and one of them has been painted five months. They have been cleaned two months with this preparation, and to-day they have a better gloss than any other cars on our system that have been out of the shop thirty days. That is a strong statement, but I can prove it. The vehicle that the cleaner is mixed with evaporates and deposits on the surface a substance that, with a slight rubbing, produces a gloss. It is an absolute protection to the varnish. You can put it onto your car and leave it there indefinitely—one month, two months, ten years—it will not do a particle of damage to it. A portion

of it has been spread over a car and put on the side track for months, wiped off, put into the service, and the varnish was protected; it was not removed. We have, I believe, to get a cleaner that is absolutely harmless, or else we are going to do damage. Cleaning with water in any form will injure and do damage in time, although some of these emulsion cleaners are so nicely adjusted you can see very little damage in a year, very little, and yet there is harm. We ought to run a car more than a year without repainting it. I am looking forward to do it. I hope to do it. I think we ought to be smart enough to clean it and protect the life of that varnish; I do not consider it impossible; I believe it will be done in the near future. I believe we want protection to our varnish as well as cleaning, and we will get it. I am going to try every cleaner that is offered to me that pretends to do this, and I am going to select the best.

Mr. Houser.—I would like to ask Mr. Butts if that cleaner is on the market?

Mr. Butts.—No, sir, it is not. It is not on the market. I couldn't say it ever will be. I don't know.

Mr. Copp.—I do not rise, Mr. President, to correct Mr. Butts to any great extent; I approve of what he has said. I was in his shop about a month ago, and he went out while I was there and got the panel that he had been experimenting on; but I think instead of a "semi-drying oil" he should say a "slow-drying oil," for an oil either dries or does not dry. There is no such thing, chemically, as a semi-drying oil. Linseed oil, I think, he characterizes as a semi-drying oil. It actually dries in 96 hours on glass, I think. I think he should say a slow-drying oil.

Mr. Butts.—I thank you, Mr. Copp, for the correction. I think that is a more correct term.

Mr. Quest.—Mr. President and Gentlemen: I had the pleasure of visiting Mr. Butts' Albany shops on Monday, and I must say that I will have to verify his statement as to the quick manner in which his cleaner removes the dirt, and also the condition in which it left the varnish. I failed to see any bloom or sweat after the using of it. But the gentleman stated to me while there that after running a couple of days the car cleaned up afterwards and presented a better appearance than it did the day it was cleaned, and I should judge by the appearance of the panel that such would be the case. I heartily agree with him, that we ought to abolish all use of oxidizing oils for cleaning purposes. I do not think that is practical, because wherever used, in the hands of unskillful men, they will fail to remove all the oil, and you have something there that you never can clean off. You practically destroy that surface without any possible chance to clean it in the future, even though you revarnish it. Of course, with the non-oxoxidizing materials, where used in a heavy form, there is that same liability of not getting it all off, and then the sun would have some action, which, I think, would be the deterioration of the varnish, and there is always a bloom, or what we would call a smooched appearance, through the use of such oil. What we want is something that will dry up quickly and thoroughly. I believe Mr. Butts said there is a wax-like deposit left on the surface—did I understand you right, Mr. Butts?

Mr. Butts.—Yes, sir, we leave a wax-like substance on the surface, a very, very thin film, hardly discernible, and yet it is there.

Mr. Quest.—It acts as the preservative, which is easily wiped at any time?

Mr. Butts.—Yes, sir, easily wiped, and doesn't hold the dust—doesn't retain the dust at all.

President Bruning.—Mr. Butts, could the members of this association get that formula from you?

Mr. Butts.—I am very sorry that I am not at liberty to say that they can. I would gladly give it if I could. I am not at liberty to do so at present.

President Bruning.—You understand that we are requested by the Master Car Builders' Association to determine what is the best car cleaner, and we ought to be prepared at this time to give them an answer.

Mr. Gohen.—Mr. President, ordinarily I am not in the habit of correcting the presiding officer, because I do not think it is right, but I do not think the Master Car Builders asked us any such thing. I believe they asked us which was the best method or system. I do not think they wanted us to come here to tell whether Smith's, Jones', or Brown's, or anybody's else was the best cleaner, but which was the best method.

President Bruning.—Yes; oil emulsion or water.

Mr. Gohen.—I have been quite an interested listener to all this, and my good friend Fitch started out very much surprised that no interest had been manifested in this question of car cleaning. He will admit now, I think, that there is quite an interest taken in it.

Mr. Fitch.—What I had reference to was the papers. There were to be half a dozen papers, and there were only two.

Mr. Gohen.—I believe there were four or five on this car-cleaning question.

Mr. Fitch.—And there were four or five that didn't write.

Mr. Gohen.—That is right.

President Bruning.—Four papers.

Mr. Gohen.—I think there were about seven who were appointed.

Mr. Fitch.—There were nine.

Mr. Gohen.—Well, there is a decided interest, gentlemen, taken in this car-cleaning question, and I am awfully glad to know that you have been interested, for I have been interested in it for sixteen years. I have never been convinced yet that we have got a perfect car cleaner, but you cannot convice me that we won't get it, and the mere fact that there have only been two or three cleaners on the market is no reason to believe that somebody is not going to stumble onto a perfect cleaner some day, just as I believe we will have a perfect sprayer. Now, there are a good many mistaken ideas altogether about cleaning. It is not many weeks ago since a certain supply man was at our place of business, and he was trying to demonstrate to our superintendent of motive power certain deductions which he had made from using certain materials; he had drawn all his information, all of his deductions from a few small panels which he had painted in a room at a temperature of 70 degrees, and had weighed out with an apothecary's scales each infinitesimal part of the pigment and oil, and drew his deductions from that one thing. I informed my superintendent of motive power that that was not the way we painted freight cars; that we painted freight cars out in the open air, and our shop was just like Brother Quest's; we have the sky for a roof and the four points of the compass for the walls; so we could not paint cars under the same conditions that those panels were painted, and I did not suppose that the cars that we painted out in the open air in all kinds of weather would give the same results as those panels that were painted inside of the house. I presume it would be proper to say that these tests of car cleaning are made possibly under similar circumstances, but in cleaning cars, gentlemen, you do not do it as a test; that is, in practical terminal car cleaning you are not cleaning cars as a test; you are cleaning them in the way of economy, you are cleaning them practically and for the best possible result you can get, possibly under unsatisfactory conditions. There has been talk about some of these cleaners being immersed forty-eight hours in order to see whether they would be destructive to the varnish. Now, gentlemen, we would not undertake to immerse one of our cars forty-eight hours to see whether it would destroy the varnisn or not, but we certainly would be perfectly willing to take cars that have been run ten or twelve, fourteen, fifteen, sometimes eighteen months, and bring those cars back in the shop with a good coat of varnish on them and without any evidence of destruction whatever. I have here—not intending to bring it as an evidence—a cleaner that you can immerse in one of these emulsions for forty-eight hours. I will guarantee that you will not only take the varnish off, but you will come mighty near taking the paint off, too. There is a piece of sheathing (indicating) taken off of a car that has been in service on our road I think fourteen or fifteen months, since it was last in the shop. Now, that car has not been cleaned with anything but oil emulsion cleaner. Brother Copp has told you the truth; he didn't vary one iota from the truth. This was cleaned with the same preparation that Mr. Copp immersed for forty-eight hours.

Mr. Copp.—Forty-two hours, all of them.

Mr. Gohen.—Well, forty-two hours. I will give you half of it—twenty-four hours will do it; if that was immersed twenty-four hours there wouldn't be a bit of paint or varnish on it; and I know that that has been cleaned at least once a month with same preparation during the last twelve or fourteen months, and there is no evidence of any deterioration whatever in that var-

nish, outside of its natural wear, and I want to say that if that car had been cleaned with soap and water, however mild it might be, possibly at an expense of twenty-five cents a cleaning, as our friend McCracken says, that varnish would not be in the same condition it is to-day. Gentlemen, you do not put your cars to that kind of a test. I want to say to you further, referring to our beloved President, of whom I read this morning that he has taken a setback; I read that his doctors have been injecting arsenic into the President's heart. Why did they do it? To do him good. I don't know what amount of arsenic they injected into that good man's heart, but it did him good, and I believe it must have been a very small quantity. Now, if one-eighth or one-twentieth of a grain of arsenic would accelerate the beating of that man's heart, and you would go and inject two or three grains into that man's heart, don't you think it would stop it immediately? Now, gentlemen, there is exactly the same principle of this immersion of panels in car cleaning. If you take your cars out, run them twelve or fourteen months, and get no damage or other bad result from it, that is a good test. On the other hand, these cleaners that have been tried under just the panel test, if they will, after the cars have run one, two or three weeks, give you the results of these cleaners that have been on the market—if they can be used as economically as these other emulsion cleaners and they do not destroy your varnish—I want to say to you that that is exactly the kind of cleaner you want, and you do not want to take any kind of oil emulsion cleaners that will destroy your varnish in the least, provided the other will do your work as rapidly and economically as this does. But under ordinary use, if it does not do the cleaning, if it will cost your company more money, you do not get the results. The slight harm that is done by the application of these other cleaners should not cut any figure in it. I have seen an oil emulsion cleaner that has an alkali in it, and I had been thinking that you could not get a cleaner unless you had an alkali or an acid in it; I now think it is possible some man may find a cleaner without these ingredients. When we made a test one year ago last month, in our Shelby Street yards in Indianapolis, Mr. Block and I saw men taking two cleaners—the Cleanola and the Modoc. They had spread them upon one-half of the lower section of the car above the belt rail—we were going to try four cleaners on that side of the car—they had spread these two cleaners, and just as they go through spreading it on, the dinner whistle blew, and those men dropped their work and went off to their dinner. It was in August, at noon, if I remember rightly, and the sun was shining, beating as strongly as it ever could on that side of that car; and I said to Block: "Now, Henry, we will see whether those cleaners do any damage to the varnish in one hour." We came back there just before those men got to work, and we watched them clean this car and remove the cleaner from it, and, gentlemen, I tell you, on my word, that you could not notice any effect it had on the varnish. Now, that is as long as you want to try a cleaner of that kind. I am very glad these cleaners are coming on the market. I am not prejudiced, never have been, have always said that I didn't think thre was a perfect cleaner on the market; I do not think there is to-day; but I believe one will come, and I would like to see it come to-morrow. That is all I have to say about that.

Mr. Fitch.—I would like to ask Mr. Gohen, how do you treat your cars between the times you clean them with Modoc?

Mr. Gohen.—I am very glad Mr. Fitch called my attention to that. It is very true that it is almost impossible to wipe off any oil emulsion cleaner free from oil. If you could you wouldn't get any of those results that some of these fellows are claiming for the oil emulsion cleaner, that it adds about seventeen years to the life of the varnish! You wouldn't get that result if that oil was not there. If a car is carelessly cleaned, you had better not put any of that emulsion on there at all. On the other hand, you may clean it ever so carefully—I do not care whether you clean it yourself, if you are personally interested in making the demonstration, or a test for the benefit of somebody else; I don't care how clean or how much you wipe that emulsion cleaner off, you are going to leave a certain proportion of that oil upon the surface of the car. But if you have fairly cleaned it, you have not left enough on there to do any damage outside of what dust might get on there and adhere to it in the next trip or two. When that car comes back again, just wipe it off with dry waste, and you have got a clean job. If you had not placed any emulsion cleaner on that car, say it was a new car out of the shop and hadn't been out more than three or four days, you run it during the dry summer months when the dust prevails very greatly on our roads, you couldn't have that car make a trip of three or four hundred miles but what the dust would adhere to that just as much as to this oil that is left upon that car. What do you do to that when you have a newly varnished car and you bring it in? You take nice, clean, dry cotton waste and you wipe that off carefully; you remove that dust; but, of course, if you let it stay there it will gradually become more adherent to the surface of that varnish; you couldn't get it off without using something. Our method of procedure is, after we have cleaned a car off, we wipe them over, regardless of the fact whether we use an emulsion cleaner on them or not, we wipe them off on every trip; that is, if they make any extended trip. Of course, on our suburban trains we do not do that; but we do wipe them off. We clean our cars with an emulsion cleaner, some of them once a month, some of them possibly twice a month; depends upon the runs and how dirty they get; we do not have any accepted time for them. If they are dirty enough to clean, then we go to work and clean them, and we have to clean our cars much oftener than some of you fellows have to; they are not as dirty as your cars, but they do look a good deal dirtier because they are so light. After we use this emulsion cleaner we have no trouble at all; we wipe them off; but of course the dirt eventually gets ground into that varnish again, and we have to use an emulsion cleaner. Anybody who tells me that he can come down to our place and take a brush and a little dab of soap and put it into water and clean one of these cars off to the satisfaction of our people for twenty-five cents, I am going to say to you that that man can get the best job with our people of any man who is a member of this association to-day. I want to say to you that it costs us more than twenty-five cents to wipe our cars off, not to say clean them. The Illinois Central takes charge of our equipment when it gets to Chicago; they don't do any emulsion cleaning whatever. All they do is merely the dusting and the wiping, and one thing and another, clean the glass, and I don't know that they always wipe the outside of our cars either; but my recollection is that we pay them seventy-five cents for every car they clean there; that is just merely wiping them and dusting them out.

President Bruning.—They mop the floor?

Mr. Gohen.—Possibly mop the floor, yes. Taking the cost of cleaning upon the Big Four Railroad as it goes along, take some of these outlying points where the local trains run, where they do not do anything but sweep out the floor, wipe the windows and dust the cushions—take that in with our terminal cleaning, such as Mr. Eicher does at Cincinnati, where he gives them a general, ordinary cleaning, not emulsion, cleaning the windows, blowing out the dust on the inside with air—that is, what we call an ordinary cleaning—the average cost of our ordinary cleaning all over our system is, if I can recollect rightly, about fifty-two or fifty-three cents per car. Some of those cars only cost us two to three cents to clean. The cost of cleaning a parlor car—not Modocing, but just ordinary wiping and dusting and blowing out—the average cost of cleaning our parlor cars at Cincinnati, Cleveland and St. Louis is about $1.05; the average cost of the ordinary cleaning of our dining cars is about $1.25, and the average cost of cleaning our first-class coaches is about seventy-five cents; and it runs on, baggage cars and that, down to about twenty or twenty-five cents. So you see, striking the general average, it comes to about fifty-two or fifty-three cents for cleaning. It costs us possibly twenty-five cents per thousand miles for ordinary cleaning. And when a man gets up and tells me that he can give a general cleaning to the outside of a car for twenty-five cents, I want to see that man come up and demonstrate that fact to our people. The reason I make the statement to you, and I will make it in all candor (I do not dispute the young man), I believe the young man has done what he says he has done; I think he has got too much sense to come here an tell us anything different from the truth; but the conditions are altogether different. It may suit his company to have him go along the side of the car with a long-handled mop, with a little bit of soap in the mop, and just go along that, one man brush it and another man throw the water on it; that may suit his people, but we do not call that car cleaning on our road. It is an altogether different operation. Now, what is the result?

You couldn't make our superintendent of motive power believe that. He says, "I know better than that; I have gone all through that; that man doesn't know what he talking about." Perhaps some of the other officials on our road who have not gone into this thing so practically as the superintendent of motive power or myself, will read the report of that, and they will commence to think, "Well, you are just throwing away about $25,000 of your company's money every year, and I think we will find somebody who can clean the cars for twenty-five cents, and save my salary." That is why I offered that young man, in all sincerity, a position on our road at a better salary than he is getting, and I think I can almost guarantee him a better salary than any master painter is getting in this association if he can do to the satisfaction of our company what he said he does to the satisfaction of his own. Now, gentlemen, there is nothing personal in these discussions. There should not be. I won't take anything personally that any man has said. If he thought I was mistaken I will be glad to have him get up and say so, and I think that is what we are here for. We are all on the right track, and I hope to see the day when we will get a perfect cleaner that will be satisfactory to all of us.

Mr. Rodabaugh.—I just want to ask Mr. Gohen if I understood him correctly, if he said that on an average it cost him fifty-three cents?

Mr. Gohen.—For all classes of cars, yes.

Mr. Rodabaugh.—Now I want to correct myself a little. In the Philadelphia convention I made a report on the cost of cleaning passenger cars. I think Mr. Gohen and Mr. Block objected to that report on that account—that the cars were cleaned too cheaply. Some one in the convention offered to bet me ten dollars that I couldn't do it. I told him I was not a betting man, but I can do it all the same.

Mr. Gohen.—I do not believe it was me, Mr. Rodabaugh.

Mr. Rodabaugh.—Now, that statement of Mr. Gohen's I think is correct. We can clean our cars successfully with Modoc. We clean our cars for an average of about fifty-two cents. That is the report that I made then. I only make these statements to the convention because I want to be correct. I do not want to make any statements before this convention that I cannot substantiate, and this shows that my report in Philadelphia was correct.

Mr. Butts.—I think the statement that he has made there, Mr. President, will be misleading. Do I understand the gentleman to say that he is cleaning cars with Modoc on their system for fifty-two cents?

Mr. Rodabaugh.—No, I do not say that. I say on an average. We clean our cars only once a month with Modoc, and we have been using it for ten years, and the cars look about as well as any of them. But the wiping-off is counted in that figure, and for that we pay from ten to fifteen cents a car, I think, for wiping off with dry waste.

Mr. Fitch.—About how many hours' labor does it take you to clean an ordinary day coach with Modoc, outside?

Mr. Rodabaugh.—Well, I cannot answer that exactly. I have to use painters for the work, and it costs me more than it would you gentlemen, who use cheaper labor; I have to use a majority of skilled labor.

Mr. Fitch.—I wasn't asking you the cost. I asked you the number of hours.

President Bruning.—How long do you think it would take to clean one car approximately?

Mr. Rodabaugh.—I think two men would clean it probably in half or three-quarters of a day.

Mr. Becker.—How often do you clean these cars?

Mr. Rodabaugh.—Once in 30 days; and that is the time we wipe them off.

Mr. Gohen.—I think I could answer Mr. Fitch very nearly the truth. If you do them as Mr. Rodabaugh does, about once every 30 days, there is no doubt about it. I would say that ten hours for one man would be a very fair average for Modocing a car. Now, if you let them run three months, or six months, it might take four times as long.

President Bruning.—I have a man in St. Louis who cleans the cars in about ten hours. Of course, if they were run four months it would be different.

Mr. Copp.—Mr. President, I merely wish to say this, supplementary to the paper that I presented: that I realize there is a vast difference between experiments and continued practice, and I give way to my brothers here who are into this business all over, and accord them a great deal of credit, and I would not have you, therefore, put too much stress upon my paper and its results, for they are small experiments. Reference has been made, however, to extraordinary tests. I think I said, in a paper last year, that I did not believe very firmly in extraordinary and unusual tests in order to arrive at conclusions.

Still experiments that have an extraordinary bearing have some uses. They are practiced in all professions and trades. It is only recently, I believe, that the doctors in Cuba called for volunteers to be bitten by mosquitoes that had been infected by yellow fever virus, and a noble nurse volunteered to be thus bitten and died. I have made tests with paint upon glass and arrived at some conclusion as to covering power and the drying properties of that paint, and the paint man would come and say, "Oh, we don't make our paint to paint glass with." Well, I say, "we shall have to look into it with glass." And so I believe that these tests I have made with those dirt-removers are valuable in this respect; that they at least reveal somewhat the nature of those cleaners, as to their deleterious effects, comparatively, upon varnished surfaces. Of course I do not expect that we are going to leave a cleaner on a car 42 hours, and yet I do not know but that some of our crude laborers, who have this cleaning to do in yards, might leave some of that length of time. So I think we cannot make these tests too thorough. If this test of immersing these moldings in the cleaner that length of time is extraordinary it teaches us something and it should have its due weight in the matter, regardless of whose cleaner it is.

Mr. Quest.—Mr. President, this subject appears to be a little more interesting than some of them anticipated, and the talk up to this time has been confined within a certain circle here in our membership. I would like to see you call on some of the rest of the members here that have not spoken on this subject yet, some member who has not made any remarks upon it. I think we may get something in that way that would be new, and that is what we are after.

President Bruning.—We would be very glad to hear from any of the members who have not spoken on this subject.

Mr. Fitch.—Mr. President, perhaps I owe this association something in the way of an apology for the remarks I made at the commencement of this discussion. When I spoke of the lack of interest that was shown, I had in my mind the fact that there were to be nine papers on this subject, and there were only four. That was what I had in mind when I said, before the discussion, of course, that the association seemed to show a lack of interest in the matter. After hearing the discussion, perhaps I should change my mind in regard to the lack of interest of the members present, but I would not care to take back anything of interest shown by the gentlemen who were asked to write papers on this matter.

President Bruning.—Gentlemen, how do you wish to dispose of this subject?

Mr. Brown.—Mr. President, I just wish to state that my only idea was to demonstrate whether there were injurious properties in those cleaners that I had at hand, and I demonstrated to my satisfaction, if nobody's else, that there were injurious properties there; and to my mind, just as you apply them, just so often there is that proportion of injury being done. I could take any of those cleaners myself personally, I could clean a car and you couldn't discover any material effects from it at the time. But I firmly believe that the continuous cleaning will bring it about. The properties are in them and they will come to the top.

Mr. Fitch.—Mr. President and gentlemen, after all this discussion I am not going to take back anything in my paper that I stated in regard to washing cars and chamoising them. You take a car when it is newly painted, it goes out on the road, runs and comes back to its terminal, you wash it properly, chamois it off as it should be and you are going to add very much to the life of your varnish and to the beauty of the varnish, and you will find you won't need nearly so much emulsion cleaner. While it may be that at certain times on head cars, the car will have to be washed, perhaps, in soiled spots, I do believe that if you will go back to the old principle of chamoising cars thoroughly when they are washed off, not letting the water dry on in the hot sun, you will find excellent results at a very small cost.

Mr. Quest.—Mr. President, as there does not appear to be any other members who wish to speak on this subject; and, as we have already ventilated our views to a great extent, I would move you, sir, that the subject of car cleaning, as it has been presented this year, be carried over to next year, with the same committee.

Mr. Coleman.—I second it.

President Bruning.—It has been moved and seconded that this subject of car cleaning be carried over for another year and that the same committee be continued. Are you ready for the question?

Mr. Little.—Mr. President. Last year when I was presiding over the convention, I was found fault with for not giving every person an opportunity. One gentleman in particular, who is here this morning, I do not want to mention his name, but the shoe will fit him, said that nobody had been given an opportunity to speak but a select few. Now, do not cut this off until that man gets a chance to talk. Give everybody an opportunity to talk who wants it.

President Bruning.—Now you have a chance. Any remarks?—one, two, three? All those in favor of the motion as stated will say aye; contrary, no. The ayes have it, so ordered. Now, gentlemen, we will take up the queries.

Mr. Gohen.—Mr. President, before you do that let me suggest that you take up the matter of the next place of meeting.

NEXT PLACE OF MEETING.

President Bruning.—Very well, gentlemen. We will have the report of the committee on the next place of meeting now.

Mr. Gohen then presented the committee's report, recommending Boston for the next convention.

Mr. Bailey.—Mr. President, I certainly hope that Boston will be the place of our next meeting. It was our birthplace, one of the oldest cities in the country, and we have one of the best, most extensive park systems in the country, some fifteen thousand acres.

Mr. Brown.—Mr. President, we have one of the largest railroad stations there and we have quite a subway there, of which one of our honored members is a leading feature; but, I regret very much that you anticipate going to Boston; it doesn't give me a chance to get away from my better two-thirds, but I should be more than pleased that it be her pleasure to be with us and mingle with you, as she cannot travel and get away from home.

Mr. Gehman.—I hope we will keep Brother Brown home for one year. (Laughter.)

President Bruning.—Well, how do you propose to vote on this thing?

Mr. Gehman.—I think Boston is the ideal place for clambakes and baked beans.

Mr. Little.—I will make a motion that Boston be selected as our next place of meeting and that the Secretary be authorized to cast the ballot for Boston.

Seconded and carried.

Acting-Secretary Cook—The Secretary, as per instructions, has cast the ballot of the association for Boston as the place of the next convention. (Applause.)

President Bruning.—Now we will hear the report of the Committee on Resolutions.

Mr. Copp then presented the following report:

RESOLUTIONS.

Mr. President and Gentlemen:

Your Committee on Resolutions begs leave to submit the following for your consideration and adoption:

Resolved, First, that, having learned with sadness, by the morning papers, that the President's condition is worse and even precarious we renew our sympathies, expressed in a former resolution and still express our hopes that he may yet be spared to us.

Second, Our thanks are due and are hereby extended to Mayor Diehl for his presence and words of welcome.

Third, To Mr. F. W. Brazier, Assistant Superintendent Rolling Stock, N. Y. C. & H. R. R. R., for his presence and helpful words.

Fourth, To Mr. F. T. Coppins, ex-president N. Y. State Association of Master House Painters and Decorators, for fraternal greetings from his association.

Fifth, To the representatives of the supply trade who by their efforts have contributed so largely to the enjoyment of this occasion.

Sixth, To our retiring President, for his interest and untiring efforts to make the meeting a success.

Seventh, To the ladies whose presence contributes so much toward the character and enjoyment of our convention.

Eighth, To the Committee of Ararngements and hotel people who evidently did their best under the conditions of the crowded city at this time of the great Exposition for our entertainment.

OBITUARY.

We regret very much to announce the deaths of five of our members, during the year past, namely, J. Weymer, A. D. Keyes, Thos. Dunlap, C. A. Bruyers and N. Ham; and as we realize the shortness of life it behooves each and every one to be prepared as we hope those were who have passed away to meet the Just Master above.

Resolved, that we tender our sympathy to the families of our deceased members, and that a copy of these resolutions be sent them and also spread upon our records.

CHAS. E. COPP,
D. A. LITTLE,
SAMUEL BROWN.

Mr. Gohen.—I move the report of the committee be received and made a matter of record.

Mr. Fitch.—I second the motion.

Carried.

UNIFORM STENCILING OF CARS.

Mr. Gohen.—Mr. President, before we go on to those queries, I am a little mixed as to what was done about the uniform system of stenciling. Was that committee retained? What instructions have been issued, or has anything been done?

President Bruning.—There has not been anything done in regard to that.

Mr. Gohen.—I think we ought to take that up right away before we go into the queries.

President Bruning.—We will take that up right away. I am glad you mentioned it. Gentlemen, what is the pleasure of this organization in regard to this committee that was appointed to wait on the master car builders in order to get up a system of uniform car stenciling? I think it would be advisable to continue that committee.

Mr. Stroud.—I move that committee be continued, with power to act.

Seconded and carried.

Acting Secretary Cook.—There has not been anything said on subject No. 6, Mr. President, but subject No. 8 it seems to me covered the point very thoroughly.

President Bruning.—We will now take up the queries. The first query is:

"Can a paint be made that will dry from the bottom up?"

Mr. Lanfersiek.—Mr. President, I asked that that query be put on the list, for this reason: a prominent painter in the West got out a little pamphlet sometime ago and made the statement that raw oil, under certain conditions, when blended with japan, could be made to dry better than boiled oil, and that it would dry from the bottom up. Of course, it is simply a question put before this association for their decision. I do not wish to discuss the matter at all, because I do not believe in the necessity of discussing any of the queries.

Mr. Brown.—I would like to go on record simply in this way: that I have been tangled up with paint, putty and varnish since 1859, and I have failed so far to find a paint that will dry from the bottom up.

Mr. Laing.—I move that the sense of this convention is that there is no paint made that will dry from the bottom up, so far as we have been able to find out.

Motion seconded.

Mr. Quest.—Excuse me, Mr. President, but you will have to discuss that some one of these days; that will be one of the live issues. The idea is right here, that when we use an oxidizing oil without any oxidizing agents, or any of these oils we use the paint oils, and we let it dry naturally, I believe that dries from the bottom up, but when you add pigment or an oxidizing matter to quicken that action, why then I believe you cannot dry it from the bottom up; you dry it from the top. Your slow-drying varnish dries, practically speaking, more or less from the bottom up. I am firm in that conviction.

Mr. Brown.—I am not.

Mr. Quest.—I say partially. I do not want to go on record to say that it does, but I think that is somewhat the nature of it—a slow-drying material.

Mr. Putz.—I might ask Brother Quest where the oxygen takes the first effect, on the top or bottom?

Mr. Quest.—On the top, most assuredly, when you add oxidizing material, but what I am speaking of now is that oil in its natural state; it is my belief, to a greater or less extent, that it dries from the bottom up.

Mr. Brown.—The question is, "can a paint"—a paint, gentlemen—"be made that will dry from the bottom up." Hickory nut oil is not a paint.

Mr. Lanfersiek.—I wrote the gentleman I referred to in regard to the matter, and I have met him personally, had a conversation with him in regard to the matter, and he told me that he studied the subject for at least 15 years before he gave an expression on the matter. His idea is this: that when raw oil is mixed with pigment or blended with japan, under favorable conditions, that is, in the winter when it is cold, a paint can hardly dry on the outside; he said that he could make a paint made with raw oil blended with japan to dry quicker than a paint with boiled oil. That is his contention—under favorable conditions. I have studied the matter somewhat since he told me about it, and I am strongly inclined to his belief, but I would not like to go on record in the matter; yet I feel that there is something in it, and more than we wish to admit. I think it is a question that the members of this association ought to take up and look into, because we have taken it for granted here in the past that all paint dries from the top down, and that ended it; we have never looked into the matter any further; and I think it is a very vital question and should be looked into.

President Bruning.—Gentlemen, it has been moved and seconded that it is the sense of this convention up to the present time we have not found a paint that will dry from the bottom up. Are you ready for the question?

(The motion was duly carried.)

Gentlemen, we will have to be a little quick about this program now. We have got lots of business to do yet. I hope that the members will understand that I do not want to take a snap judgment on any of the brothers, but I hope two or three of them won't get up one time after another and keep the rest back, because we have got lots of business to attend to.

The second query is:

"What is the best method for making illuminated numbers for locomotive headlights?"

Mr. Brown.—Mr. President, two years ago, I put into practice a method, that Mr. Lanfersiek gave us a sample of; that was, to cover a piece of glass—it is called opal, that white glass—cover that with a piece of Pantasote, a material that is largely used now, it is quite thin, and glue it on to that glass, cut your letters out, leaving your letters white and the other part black about it, and then another piece of plain glass simply put over that and put in your headlight. That has been in service on one engine two years in October. They wipe it off occasionally, but it has not needed a new one since. We have many others and we are doing all of our engines in that way, and I have not as yet found anything that goes ahead of that. Mr. Lanfersiek is entitled to the credit for that method.

Mr. Hartman.—We have been using a system something similar to that, only we cut out a stencil of tin, placing it between opal glass on the inside and plain glass on the outside. It enables us to keep the numbers clean at all times. We are not troubled with any sweating, as we were formerly under another system. It was adopted by Mr. Nicoll of the Northern Central about fifteen years ago, and I have been using it since I have had charge, the last six years.

Mr. Gehman.—In our headlights, we take ground glass, leave the numbers plain, paint the rest with a black engine-finish or dark color and put clear glass back of that; it gives perfect satisfaction. All we have to do is to wipe off the clear glass and leave lettering intact.

Mr. Nicoll.—This is a small sample (indicating) I brought along here after I saw the query, and it is similar to what Mr. Hartman spoke of. We use paper between two glasses, or rather, a piece of porcelain on the inside, a piece of clear glass on the outside, cutting the stencil out of paper ,and we putty them in to exclude all dampness and dust. They are only wiped off occasionally. We varnished an engine a few weeks ago, and it had a glass that had been in use two years and over; and yet there was no soil whatever about it.

Mr. Brown.—In regard to the method that I spoke of, even if your glass gets broken, that Pantasote will hold it together and you still have your number all right. I told our Plymouth Division engine painter of the method, and he has adopted it there. In regard to painting on glass, we all know that there is a strong liability of the heat and the sweating getting after that, and it very soon peels the paint off. Another member of our association cuts his figures out of thin tin and puts them between two pieces of glass. He blacks the tin on the outside and puts on the ground glass. Well, now, the oil from the lamp will get into that ground glass and the first thing you know you have got a dim, dull-looking arrangement, but the opal glass, gentlemen, looks clear and nice all the time.

Mr. Jones.—We use numbers something similar to Mr. Hartman. They are stamped out in zinc, with a ground glass behind and a clear glass in front.

Mr. Laing.—There is another side of that question, Mr. President. Very often you wish to change your headlight from one engine to another. One headlight gets broken and you have got no extra headlights so you have to change. We use just the ground glass, with a tin or sheet-iron number, blacked over, and with the opal glass on the inside. If you wish to change your headlight you can do it in five minutes. You can remove both the tin and opal glass, wipe them off and put them back. In that way your headlight is not tied to any one engine.

President Bruning.—Gentlemen, we will now take up query No. 3.

"What is the best method of treating front ends of locomotives with a view of keeping them in good condition?"

Mr. Nicoll.—Mr. President, I think it is a hard matter to tell what is the best method. We have been trying for several years to get something that will stay on there, and I have failed to find anything yet that will stay. We have had sample upon sample sent to us but we never found anything that would really stay over one or two trips because it burns off red; if it does not burn off red in the general make-up of the extension, it is more or less so on the spark pot.

Mr. Dane.—Mr. President, I have the formula of a compound we use on the front ends of our locomotives with very good success. Of course, there are some engines that it is almost impossible to keep in good condition; they will leak; and when a front end leaks, those cinders get afire and no paint will stay on a red-hot stove. My formula is, 25 gallons of raw linseed oil and 22 gallons of Sipe's japan oil, and about 20 pounds of lamp black; the lamp black comes to me in cans ground in oil; and I mix that up in some of the oil, then I put in three gallons of engine finish; that gives it a binder, and makes it a little blacker than the lamp black. This will make it a very thin wash. It is almost impossible to put it on with a brush, and for that reason firemen and roundhousemen can put it on with impunity and not waste it or have it all gummed up; it would cost more than the ingredients cost to supply firemen and roundhousemen with brushes. They would use it once, and, of course, the brush would be hardened up before they used it again. That is at a cost of about 70 cents a gallon. We have tried any number of different articles that have been sent to us for trial for front-ends, and I have failed to find anything yet that has proved so satisfactory as that has.

Mr. Ginther.—I have been using very nearly the same formula that Mr. Dane has. I have tried nearly everything that I could get hold of, and I find that that is about the best one. But I use less Sipe's oil. Instead of using the engine finish I use up my slop varnish.

Mr. Quest.—Just as I was coming away, our superintendent of motive power tried to get something that could be put on the front ends of our engines that wouldn't burn off right away. I do not know whether it is owing to the nature or class of engines we use, but we had to abandon all kinds of paints; that is, any mixing vehicle; and use altogether graphite and signal oil. Of course, that necessitates doing them over after a night's run in moisture or rain, but in nice weather we sometimes get a week or two out of that, but we have abandoned the painting altogether for want of something that will do the work satisfactorily, and we are using graphite.

Mr. Dane.—That looks like stove-blacking.

Mr. Quest.—Just the same as stove polish.

Mr. Dane.—That doesn't look very well.

Mr. Jones.—Mr. President, I use on the front ends of engines nothing but oil and lamp-black—a very thin coating—and put it on after the engine has been steamed and is hot and it bakes right on there, and is as good as anything.

Mr. Brown.—We have been using for a number of years simply boiled oil and a little lamp-black in it, and the secret of the whole business is in doing it often. It is unreasonable to expect it is going to stay there a great while. The firemen take care of that part of the business. we supply the material.

Mr. Lanfersiek.—Mr. President, it seems to me that there is really nothing that will stand on a front end. If the front end admits any air, the cinders of course will take fire, and that will burn it off. If there is no air, every time the engine comes in from a trip it is opened, then the contraction of the metal breaks it off. The only thing to do is to do them every trip or every other trip, as soon as they get dirty or scaled off.

Mr. Gebman.—I use the same material as Mr. Brown uses—lamp black and oil. But I was anxious to know what actually was the best way, and I thought of course I could get information from Brother Dane or others who have had a great deal of experience with engines. I think it is a very good thing to know what the different men use on the engines, because that is a very important thing to know.

Mr. Laing.—Mr. President, I am using a preparation of one-half Oxford black and one-half raw oil, and the engine will run for two or three weeks with that except when you get a rainstorm.

Mr. Quest.—I would like to ask the gentleman what he does with his accumulation, after using it; that is, the parts that do not become burned off? Do you have any trouble scraping it off?

Mr. Laing.—We have a man that attends to that business all the time in the roundhouse; does nothing else.

President Bruning.—What is this Oxford black ground in?

Mr. Laing.—It is an asphaltum black.

President Bruning.—Well, gentlemen, this subject seems to have been pretty thoroughly discussed. If there is no one else who desires to speak on this subject, we will take up Query No. 4:

"Is it advisable to add wax to varnish in order to deaden the luster in imitation of a rubbed surface?"

I think you can all answer that question and say no.

Mr. Schumpp.—That is the way I find it, Mr. President. I know if I take a varnish and add wax to it, it is bound to crack.

Mr. Miller.—It is more apt to crawl than it is to crack. I move that we most emphatically disapprove of the use of wax with varnish.

Seconded.

President Bruning.—You have heard the motion that we disapprove of the use of wax with varnish. Are you ready for the question?

Mr. Russell.—What are you going to put in if you want to deaden it? I have used it for 20 years without a crack of any kind.

Mr. Miller.—Wax can be used successfully, but it is not a practical thing to use on a car. I have had cars before now that have had the ceilings waxed and it became necessary to revarnish them; I did not at the time know that the wax was on; I varnished over them and got into trouble. You can never do anything else but wax after you have once waxed. That has been my experience.

President Bruning.—You have all heard the motion.

(The motion was duly carried.)

President Bruning.—The next question is:

"Can a sand blast be operated successfully in a railway car and locomotive paint shop?"

Mr. Little.—Yes, sir; it can.

Mr. Brown.—Yes, sir.

Mr. Little.—Several members here, Mr. President, have sandblasts operating successfully. Mr. Quest, Mr. Houser, Mr. Lanfersiek, all use them. I would use it myself, but I am not situated so that I can do so.

Mr. Houser.—In that connection I would say I do not know how I could get along without a sandblast, it is the best friend I have.

Mr. Waggoner.—We are using it successfully.

Mr. Dane.—I would like to ask these gentlemen how they use it in a locomotive paint shop; supposing you are varnishing?

Mr. Houser.—I do not use it in the shop. I use it outside entirely.

Mr. Dane.—The question says "in the shop."

Mr. Houser.—It means in connection with a shop.

Mr. Dane.—It says "in a railroad car and paint shop."

Mr. Little.—It was not intended to convey that impression—but to ask whether it could be used in connection with the paint shop.

Mr. Dane.—That is different.

Mr. Little.—You must have a place provided to use it outside.

Mr. Lynch.—We have had some experience with the sandblast in our shop. It has been used successfully there, and I only regret that it has not been used successfully at Altoona and other shops. I believe that the proper place for a sandblast to be used is on the new steel cars, to get rid of that scale that has been spoken of. It would assist us following up the work very much afterwards.

Mr. Quest.—All I want to say is that the promised blue-print and photographs, which I said I would attempt to write up on our plant was a little late in getting to the Journal; so it did not appear in this month's journal; but the P. & L. E. sandblast sheet-cleaning machine will, in all probability, appear in a subsequent number of THE RAILROAD DIGEST.

Mr. Houser.—In that connection I would say, I have a sandblast in operation. If any member wants a blue-print of it, and will send me a note, I will be glad to send him a print at any time.

Mr. Fitch.—Is this sandblast used on anything but new iron?

Mr. Houser.—Yes, on both new and old.

Mr. Lynch.—It has been used successfully by us on old paint. We can, of course, blow off old paint with the scale, just the same, but it is easier to blow that scale off new iron than it is to blow paint and scale off at one time.

Mr. Brand.—Did I understand the gentleman to say that they could remove old paint from a tank successfully?

Mr. Little.—Yes sir. Mr. Houser does that; he stated that, in reply to Mr. Fitch. Mr. Kahler uses it right along for removing old paint from tenders.

President Bruning.—I have the same kind of a machine that Mr. Houser has, I got the blue-print from him.

Mr. Lanfersiek.—I want to say that it will not only remove the old paint, but you can blow a hole clean through the side if you keep it there long enough. That is evidence that it will take the old paint off. Mr. Lynch will bear me out. I know he uses it very successfully, and it was through him that I got my machine. Before we got the machine we used to scrape it off, file or rub it off with sandstone and everything of that kind; but we have taken the scale off a new tender with a capacity of five or six thousand gallons in seven hours. I think Mr. Lynch will bear me out in the assertion. For that reason I certainly believe that the sandblast can be used successfully in any paint shop.

Mr. Gehman.—I am not using the sandblast, but for my information I would like to ask Mr. Lanfersiek what kind of preparations they have there; any special building or special room away from the painting and varnishing?

Mr. Lanfersiek.—We do it outside in the open; "the sky is the roof and the four points of the compass form the walls," as Mr. Gohen says. We have never tried it inside, and I do not think it would be quite practicable to do it inside unless you have an extensive place. It creates quite a lot of dust. You can have a hood to put over a man's head, but our people prefer not to use the hood. They simply use ordinary fifteen-cent spectacles, and do it very successfully.

Mr. Long.—I do not know how I could get along without a sandblast. I do not know how anybody gets along. We use it for most everything in the way of taking off old paint and scale; anything that we can get to the sandblast we use it on. We use it outdoors.

Mr. Canan.—How long does it take to remove old paint?

Mr. Lanfersiek.—Two men can remove the old paint from a locomotive tank in ten hours.

Mr. Schumpp.—I can verify the statement of Mr. Lanfersiek. We take the same time that he does. We can take the scale

off a tank in seven hours, and can take the scale and paint off in ten hours. Some one may ask what kind of sand we use? White sand is entirely too fine. I think that has a great deal to do with it. We use a common sand that we have about Louisville, Ky. We sift it first, and afterwards put it through the sandblast and use it from that time on. It is a coarse-grained sand, not a fine sand at all.

Mr. Houser.—The sand is better the second time it is used than it is the first time. I always try to save it and use it over.

Mr. Lanfersiek.—When we are using the sandblast, to take the paint or even the scale off the tender, we have canvas spread around on the ground to catch all the sand; the sand that we use is the same kind that is used on the engine. We save all of that sand; and, as Mr. Houser says, it is fully as good the second time, and probably better than it was the first time.

Mr. Miller.—How many times can the same sand be used successfully?

Mr. Lanfersiek.—Just as long as any sand remains on the ground and you pick it up it can be used, but a great proportion of it flies away as dust; probably one-half of it flies away: all that is left you can use.

Mr. Miller.—By the occasional addition of new sand you never have to discard the sand?

Mr. Lanfersiek.—That is so, yes.

Mr. Russell.—How much more does it cost to take the paint off tanks with the sandblast than it does with potash or caustic soda?

Mr. Lanfersiek.—The advantage you gain over the caustic soda will more than pay the difference.

Mr. Eagle.—I would like to ask Mr. Lanfersiek what kind of sand he uses?

Mr. Lanfersiek.—As I said a while ago, it is the same kind of sand they put into the sand boxes on the engine. I cannot say where they get it, but it is common, ordinary, yellow sand, taken out of some sand bottom. Of course the sand that had the least dirt in it would be the best, so I suppose for that reason that lake sand would be the best.

Mr. Little.—I make a motion that it is the sense of this association that a sandblast can be successfully operated in connection with a paint shop.

Seconded and carried.

President Bruning.—Now, gentlemen, query No. 6:

"What is the best oil for rubbing the varnish inside of passenger cars to reduce the surface to a dead finish?"

Any remarks on this subject?

Mr. Siday.—I use the mineral seal oil; but, instead of using the oil with pumice stone, I rub down with pumice stone and water; the water causes the pumic stone to flow out and enables us to get into the crevices; after which I go over with a mineral seal oil, go all over the car, and then dry it off thoroughly with fine waste. I find that gives us better results than it does to rub it over with the oil, using the oil and the pumice stone together.

President Bruning.—Any other remarks on this subject? If not we will take up query No. 7:

"What is the cause of varnish turning white on locomotive tanks, and how to prevent it?"

Mr. Little.—I believe it is caused by non-elastic varnish and steam, of course. A good elastic varnish will stand steam—a good varnish.

Mr. Dane.—If that is the cause, why, I think that is the reason why I don't have any white tanks.

Mr. Little.—If you put rubbing varnish on the tank and let the steam blow on it you will have a white tank.

(Mr. James A. Ferguson, of the Translucent Window Sign Co., of New York, then explained the use of his transfer letters on headlights.)

President Bruning.—Gentlemen, all things come to an end, and so it is with my office. I am now ready to vacate it and install the new officers. Before doing so I wish to thank the members of this organization, from the bottom of my heart, for the cordial and hearty support they have given me for this past year. If it had not been for their kind assistance I do not know what I should have done. Gentlemen, I thank you.

I now have the pleasure of introducing to you your newly-elected President, Mr. Dane.

Mr. Dane.—Mr. President and Gentlemen: When I was a little boy attending school one of the greatest bugbears to me was declamation; and if you expect an orator for a president you have elected the wrong man. I am willing to do everything in my power to aid and assist this association and its members. The next in order will be the inauguration of the Vice-President. I have the pleasure of introducing to you Mr. W. C. Fitch, of California, whom you have elected First Vice-President of this association for the ensuing year.

Mr. Fitch.—Mr. President and Gentlemen: At the time of my election I thanked you for my election. I said then that I thought perhaps you had conferred the favor on me more on account of the distance I had come than for my ability to serve you, but should I be fortunate enough to be promoted to the position of President of this association at some future time, I can assure you that I will do my best to fill the office as well as I can. In the present position I won't have very much to do, but I will try to do that as well as I can. Gentlemen, I thank you. (Applause.)

President Dane.—The next will be the Second Vice-President. I have the honor of introducing to you Mr .C. A. Cook, of Wilmington, whom you have elected as Second Vice-President.

Mr. Cook.—Mr. President and Gentlemen: I really have not anything to add to what I said when I was elected to the office of Second Vice-President. I will only repeat that I appreciate very deeply the honor conferred upon me, and will do my best in all respects to fulfill the duties of the office to which you have elected me, considering always the best interests of this association. (Applause.)

President Dane.—It gives me great pleasure to introduce to you Mr. McKeon, who has been elected, as usual, our Secretary and Treasurer for the ensuing year.

Mr. McKeon.—Gentlemen, I thank you for the honor you have again conferred upon me. As you all know, I have not been able to attend to the business of this convention as I usually do, but having been assisted by Brother Cook, we will try to get up a report in as good a shape as possible. I thank you for the assistance you have rendered me through him and hope you will overlook my shortcomings at this meeting. I hope at our next meeting, to be able to attend properly to the duties of the office of Secretary. Gentlemen I cordially thank you for your continued favor. (Applause.)

President Dane.—I will now read the list of the committees I have appointed for the ensuing year:

ADVISORY COMMITTEE.	COMMITTEE ON TESTS.
D. A. Little, Chairman,	W. O. Quest, Chairman,
J. Lanfersiek,	G. H. Worrall,
Charles E. Copp,	H. M. Butts,
J. T. Rodabaugh,	J. T. Rodabaugh,
Thomas Byrne,	Frank Crocker.
J. H. Kahler,	

COMMITTEE ON INFORMATION.	HOTEL COMMITTEE.
Samuel Brown, Chairman,	Charles E. Copp, Chairman,
J. W. Houser,	Samuel Brown,
B. E. Miller,	R. L. Whitton,
Warner Bailey,	O. R. Ford.

Mr. Gehman.—I move we adjourn.

Mr. Lanfersiek.—I second the motion.

President Dane.—Gentlemen, it has been moved and seconded that we do now adjourn. All those in favor of that motion manifest it by saying aye; contrary minded, no. Carried.

MEMBERS IN ATTENDANCE.

Following is a list of members shown by the roll call as being in attendance at the convention:

A. L. Allen, N. Y. C. & H. R. R. R., West Albany, N. Y.
E. J. Aubrey, Pere Marquette R. R., Muskegon, Mich.
Frank Bailey, Buffalo St. Ry., Buffalo, N. Y.
Warner Bailey, Boston & Maine R. R., Concord, N. Y.
A. S. Bauer, Evansville & Terra Haute Rly., Evansville, Ind.
J. C. Brand, D. M. & N. Ry., Proctor Knott, Minn.
A. M. Bradley, B. & O. S. W. R. R., Washington, Ind.
Samuel Brown, N. Y., N. H. & H. R. R., Boston, Mass.
H. M. Butts, N. Y. C. & H. R. R. R., West Albany, N. Y.

Thos. Byrnes, C. & O. Ry., Richmond, Ind.
H. Block, C. C. C. & St. L., Brightwood, Ind.
C. H. Becker, C. C. C. & St. L., Delaware, Ohio.
C. D. Beyer, Louisville & N. Ry., Pensacola, Fla.
A. J. Bruning, L. & N. R. R., Evansville, Ind.
C. Clark, N. C. & St. L., Dennison, O.
Chas. A. Cook, P., W. & B., Wilmington, Del.
Chas. E. Copp, B. & M. R. R., Lawrence, Mass.
A. S. Coleman, Intercolonial Ry. of Can., Montcon, N. B.
J. T. Casey, Penna. R. R., Lambertville, N. J.
R. Dory, N. Y. C., Depew, N. Y.
Robert Dennison, P. & R. R. R., Reading, Pa.
W. H. Dutton, L. V. R. R., Sayre, Pa.
A. P. Dane, B. & M., Boston, Mass.
Wm. E. Dyer, St. Albans, Vt.
C. I. Eagle, 511 Adams Ave., Scranton, Pa.
H. B. Forristall, C. H. V. & T. R. R., Columbus, O.
H. W. Flanagan, C. G. W. Ry., Olwein, Iowa.
H. W. Forbes, Erie R. R., Bergen Junction, Jersey City, N. J.
W. C. Fitch, Sou. Pac., Sacramento, Calif.
F. C. Fry, Electric Ry. Co., Cleveland, O.
Frank Fisk, T., St. L. & K. C. Ry., Frankfort, Ind.
J. A. P. Glass, Y. & M. V. R. R., Vicksburg, Miss.
A. Gamble, Can. Pac., Winnipeg, Manitoba.
John T. Green.
John T. Gearhart, Asst., Penna. R. R., Altoona, Pa.
J. A. Gohen, C. C. C. & St. L., Indianapolis, Ind.
F. A. Gowe, T. H. & I., Terra Haute, Ind.
G. J. Ginther, Wabash R. R., Moberly, Mo.
G. H. Gehman, N. Y. N. H. & H. R. R., Norwood, Mass.
T. J. Hutchinson, Grand Trunk R. R., London, Ont.
G. M. Hoefler, Brooks Loco. Works, Dunkirk, N. Y.
E. Hartshorn, M. C. R. R., Augusta, Me.
J. W. Houser, Cumberland Valley R. R., Chambersburg, Pa.
J. G. Hilpert, C. L. & W., Loraine, Ohio.
John Hartley, A., T. & St. Fe, Topeka, Kans.
T. Baker Hall, Wason Mfg. Co., Springfield, Mass.
H. C. Herron, Ohio Central R. R., Kenton, O.
C. Hodgers, Sanford, Fla.
H. Hengereld, Fla. Southern R. R., Palatka, Fla.
C. B. Harwood, C. & O. R. R., Huntington, W. Va.
J. C. Hartman, Western of Md., Union Bridge, Md.
Wm. M. Joyce, Baldwin Loco. Works, Philadelphia, Pa.
Thos. Jones, Can. Pac., Montreal, Can.
J. M. Johanns, B. R. & P. R. R., Rochester, N. Y.
David James, Pa. R. R., Oil City, Pa.
J. G. Keil, L. S. & M. S., Buffalo, N. Y.
J. H. Kahler, Erie R. R., Meadville, Pa.
W. G. King, D. S. S. & A. R. R., Marquette, Mich.
E. A. Kimmerly, L. E. & D. R. R. R., Walkerville, Ont.
F. Kaulter, C. & O. R. R., Covington, Ky.
Chas. Koons, St. L. Car Co., St. Louis, Mo.
F. E. Kerr, C. & P., Wellsville, O.
A. Kenyon, H. & St. Joseph R. R., Hannibal, Mo.
A. Lambke, Pullman Car Shops, Buffalo, N. Y.
J. B. Lainhart, D. & H. R. R., Green Island, N. Y.
D. A. Little, P. R. R., Altoona, Pa.
T. J. Lawler, 4296 Page Ave., St. Louis, Mo.
A. R. Lynch, P. C. C. & St. L., Dennison, O.
J. Lanfersiek, P. C. C. & St. L., Columbus, O.
D. G. Lyon, L. V. R. R., Buffalo, N. Y.
H. Liebenthal, Cin. Northern R. R., Van Wert, O.
Jas. Looker, Wabash R. R., Toledo, O.
Eugene Laing, Northern Cent., Elmira, N. Y.
J. H. Long, C. B. & Q., Aurora, Ill.
H. Laidler, P. R. R., Sunbury, Pa.
G. W. Lord, Fitchburg R. R., Fitchburg, Mass.
B. E. Miller, D. L. & W. R. R., Scranton, Pa.
T. J. Mullally, Armour Car Lines, Chicago, Ill.
J. C. Martin, Ill. Cent. R. R., Paducah, Ky.
A. J. Miller, L. & N. R. R., New Decatur, Ala.
Wm. Mullendorf, Ill. Cent. R. R., Burnside, Chicago, Ill.
C. L. May, H. & T. C. R. R., Houston, Texas.
C. E. Mance, N. Y. O. & W. R. R., Middletown, N. Y.
W. L. Marsh, Western Ry. of Ala., Montgomery, Ala.
S. H. McCraken, L. H. & St. L., Cloverport, Ky.
Wm. McKenzie, Grand Trunk, Montreal, Can.
W. R. McMasters, Wabash R. R., Decatur, Ill.
John McMurtry, Pittsburgh Loco. Works, Pittsburgh, Pa.
Robt. McKeon, Erie R. R., Kent, O.
C. M. Nicolls, Chi. & Western Ind., Chicago, Ill.
A. A. Nicoll, Northern Cent., Baltimore, Md.
W. F. Ottman, B. & O. S. W., Chillecothe, O.
W. J. Orr, Cent. of Vt., St. Albans, Vt.
A. Payn, Metropolitan St. Ry. Co., New York City.
J. Putz, B. & O. R. R., Chillicothe, O.
D. L. Paulus, Barney & Smith Car Co., Dayton, O.
W. O. Quest, P. & L. E. R. R., McKees Rock, Pa.
W. J. Russell, Grand Rapids & Ind. Ry., Gd. Rapids, Mich.
T. J. Rodabaugh, P., F. W. & C. R. R., Fort Wayne, Ind.
C. Rosenbergh, C. N. & W., Clinton, Iowa.
H. G. McMasters, C. R. R. of N. J., Elizabethport, N. J.
F. G. Shafer, W. & L. E. R. R., Toledo, O.
G. Schumpp, L. & N. R. R., Louisville, Ky.
C. H. Steadman, N. Y. N. H. & H., New Haven, Conn.
Robt. Shore, L. S. & M. S. R. R., Cleveland, O.
E. B. Stair, Cent. of Ga., Macon, Ga.
J. B. Shuttleworth, Rutland R. R., Rutland, Vt.
John Siday, Plant System Ry., Savannah, Ga.
R. W. Scott, N. Y. P. & N. R. R., Cape Charles, Va.
D. W. Smith, P. F. W. & C., Allegheny, Pa.
B. F. Seisler, P. & W. Ry., Allegheny, Pa.
J. P. Stroud, Allegheny Valley R. R., Verona, Pa.
W. H. Truman, Sou. Ry., Columbia, Ga.
D. B. Vail, Erie R. R., Buffalo, N. Y.
Wm. Vogel, Mo. Pac. Ry., St. Louis, Mo.
J. N. Voerge, D. L. & W., Buffalo, N. Y.
W. D. Wood, N. Y. C. & H. R. R. R., West Albany, N. Y.
B. F. Wynn, P. R. R., Pitcairn, Pa.
F. A. Weiss, C. R. R. of N. J., Wilkesbarre, Pa.
G. H. Worrall, B. & M. R. R., Somerville, Mass
C. R. Wallace, Erie R. R., Susquehanna, Pa.
Edwin Webb, Laconia, N. H.
Aug. Wolter, C. I. & L. Ry., Lafayette, Ind.
C. H. Weinstein, North Hudson Co. Ry., W. Hoboken, N. J.
A. J. Weidler, P. R. R., Renova, Pa.
J. P. Wagner, N. & W., Roanoke, Va.
R. J. Zebble, Pere Marquette R. R., Ionia, Mich.

BOOKS REVIEWED

PECK'S BUYERS' INDEX.

Peck's Buyers' Index, No. 59, contains among other things an article on Export Agencies, which are held to be fruitful if under proper auspices, but otherwise a source of chagrin to manufacturers. Satisfactory results are said to be obtainable by using the services of established importers. The index is, as many already know, designed to be the medium of economic purchase between the larger foreign users of American manufacturies and the more reliable and reputable manufacturers of the United States. There are sixteen pages devoted to an alphabetically arranged article index, followed by an index of one hundred and eleven countries and 1,786 foreign cities, throughout which the Index circulates. At the back of the book an index is given of the reliable manufacturers in the United States. The reading matter, illustrations and advertisements are all good. The annual subscription is $5. It is published by William E. Peck & Co., 100 William street, New York City.

BALDWIN RECORD OF RECENT CONSTRUCTION

The little pamphlet issued by the Baldwin Locomotive Works, No. 25, is a reprint of the paper read by Mr. S. M. Vanclain at the February meeting of the New England Railroad Club and the discussion which followed. In this paper it will be remembered Mr. Vanclain gave an outline forecast of the probable changes in the locomotive of the future.

No. 26, in the words of its author, "contains information pertaining to a great variety of locomotives of different gauges and for different kinds of service, representing current requirements. They are presented without special arrangement, and mainly in the order of construction." The catalogue is printed in English and French, and gives some particulars of a "mountain climber" for the Manitou and Pikes' Peak Railway.

AIR BRAKE ASSOCIATION

The Proceedings of the Eighth Annual Convention of the Air Brake Association, though somewhat late, has just been received. It contains reports of the committees on "The Pressure Retaining Valve," "Air Pump Exhaust for Passenger Train Heating," "Unconnected hose hanging free vs. coupled, with a well designed and located dummy coupling," and "Terminal test plant,, why and where needed," with discussion in full on each of these interesting and instructive reports. The new portion of the "Questions and Answers" of the association with the discussion thereon, are given. The address delivered by Mr. G. W. Rhodes, Mr. John Chamberlain, and Vice-President Otto Best, at the meeting of the association occupy several very interesting pages of the book.

The secretary makes the following announcement in connection with this issue of the air brake "proceedings":

The prices of the books will remain as heretofore, viz.: 50 cents for paper and 75 cents for leather bound copies. Price to members, 40 and 65 cents, respectively.

BROWN HOISTING AND CONVEYING MACHINE CO.

A five-year-old boy, after surveying all he could see of a busy railroad yard and noting the greater number of box cars, remarked: "There are freight cars and passenger cars and freight cars—an engine can have any kind of cars it likes." A perusal of the 1901 edition of this company's crane catalogue will satisfy any railroad executive officer that he may have the same wide range of choice which the locomotive was supposed to possess. The book shows half-tone illustrations, and gives information regarding steam locomotive and wrecking cranes, electric traveling cranes, high-speed balanced cantilever cranes, high-speed gantry cranes, hand traveling cranes, jib cranes of the hand, electric air or pulley block types, floating cantilever cranes, stationary hand cranes, pillar cranes and hand wrecking cranes, hand truck cranes, overhead tramrail and trolleys, safety crabs and winches, and railroad transfer tables, and, as if all this array, in which an almost infinite variety is presented, might fail to satisfy, a number of special cranes are enumerated, and among the concluding pages of the book appears an electric traveling telescope coke pusher.

AMERICAN SOCIETY OF CIVIL ENGINEERS

The twenty-seventh volume of the Proceedings of the American Society of Civil Engineers has just come from the press. The papers read were on the Mechanical Installation in the Modern Office Building, by Mr. C. G. Darrach; Short and Easy Methods for Computing Probable Errors, by Mr. E. A. Fuertes, and Transition Curves, by Mr. W. B. Lee. There were discussions on eight topics of interest to the engineering fraternity, the original papers having been printed in April. The thirty-third annual convention of the society was held at Niagara Falls, N. Y., on June 25, 26, 27 and 28, 1901. The total registered attendance of members of the society of all grades was 317.

Conventional Items

The thirty-second annual convention of the Master Car and Locomotive Painters' Association of the United States and Canada has now become a part of its history. It was held in the convention room of the Hotel Columbia, Buffalo, N. Y., September 10, 11, 12 and 13, 1901, opening at about 10 A. M. the 10th with President Bruning in the chair. Mayor Diehl welcomed the association to the city in an appropriate address, and ex-president Coppins of the National Association of House Painters and Decorators, and a prominent member of that fraternity locally, extended fraternal greetings. There was an unusually large attendance. Those who feared the Exposition would spoil the convention must have been happily disappointed, for a better attendence upon the sessions was never seen, nor was more interest ever taken in the discussions. It seemed to be generally agreed, to attend to business half of the day and to the Exposition the other half. The hotel accommodations of course were not in comparison with preceding meetings, but this in no way reflects on the committee in charge, for it did its best on this crowded occasion, and we have yet to learn of any one who did not happily accept the situation and have a good time.

The RAILROAD DIGEST having consented to remain the official organ of the association until December 31, 1901, I have also agreed to edit this department, as before, during that time; and I therefore have to now re-salute its readers as editor pro tem. I retired in good faith with the September issue, and do not wish my readers to think I am trying to carry on an editorial "peek-a-boo." After the December number is published, a committee of five, of which I am a member, will determine our future course.

CHAS. E. COPP.

Those who witnessed the jam at the N. Y. C. R. R. station, Buffalo, Saturday morning after President McKinley died, when everybody, including our members and wives and sweethearts, wanted to go home at once, will never be disconcerted with any less of a pandemonium. When ladies' collars and eyeglasses were trampled under foot it is a wonder that nothing worse happened. It was like putting the Mississippi river through a lawn sprinkler, to get the people through those gates.

Boston, after twelve years, will again be honored with the presence of our convention in 1902. It was held there last in 1890, at the American House, Hanover street. It was there that our popular and useful member, Jas. A. Gohen, first joined. May he live to celebrate the day. At that time we were given an excursion to Plymouth and return via Nantasket by the Old Colony R. R., and had for an honored guest the late lamented Jas. N. Lauder, the superintendent of motive power and rolling stock of that road.

The Social Features

Those who do not believe that "all work and no play makes Jack a dull boy" never did much work or have played a good deal. It quickens Jack's blood and stimulates him for a whole year to get his wife on his arm and peregrinate on the pilgrimages arranged by the supply men.

Tuesday afternoon, the first day of the convention, tickets were distributed for the great "Pan-Am. show," as they call it in Buffalo, whither they wended their way in merry parties via the N. Y. C. "Belt Line," remaining until after the gorgeous electrical display and a peep at the midway attractions.

Wednesday afternoon a delightful excursion of the entire convention (329 persons) was had to Niagara Falls, via "Belt Line" to Ferry street wharf, thence by steamer "America" to Slater's Point, Canada, and thence by trolley cars to the Falls, where some time was spent in sight seeing; and, crossing to the American side, the return was made in the N. Y. C. R. R. to Buffalo in season for participation in the theatre parties in the evening, which many if not quite all enjoyed.

Thursday afternoon, and likewise Friday, after adjournment and lunch, tickets for the Exposition were again distributed, which pleasure many accepted and enjoyed, returning at a late hour.

Souvenirs

The usual variety of souvenirs, without which no convention would be complete, were in evidence. J. B. Sipe & Co. gave a silver cigar rest and ash tray, the cigar resting in a suitable hollow device attached to the hump on the back of a buffalo standing in the ash tray, with the word and figures "Buffalo, 1901" engraved in the bottom of tray, also pocket rules. Wolfe, Walker & Co. gave a glass cold-cream jar with silver cover to the ladies and shell mustache comb with silver handle to the gentlemen. W. H. Coe Mfg. Co., cigar cases to men, and handkerchiefs to ladies, embroidered in corner, "1901, Souvenir, M. C. & L. P. A., Buffalo." Sherwin Williams Co., nice morocco pocketbooks. Devoe & Raynolds Co., sterling silver stickpin, the head representing a paint pot with a buffalo on it and a paint brush handle in sight. Berry Bros., jet pocket match safes and aluminum pin trays, with picture of their "Castle Copal" of Pan-American fame in bottom; also court plaster books in celluloid bindings enclosed in neat cases of same, both illustrated with same picture, also the famous "toy wagon." The Patterson-Sargent Co., watch chain charm with representation of a yacht on face, whether the "Columbia" or "Shamrock II," is not indicated. Lucas & Co., match safes and little gilt cars and engines for watch chain or other pendants. Glidden Varnish Co., pocketbooks. The Cleanola Company gave handsome celluloid desk blotters.

Record of New Equipment

Ordered during the Month of September, 1901

CARS

Ordered by	No.	Class	To be built by
A. T. & S. F.	450	Tank.	Own Shops.
Atl. Coast Line	4	Coaches.	Pullman Car Co.
Blk'w'l Enid. & So. W.	4	Cabooses	Mt. Vernon Car Co.
Blk'w'l Enid. & So. W.	100	Frt.	Am. Car & F. Co.
Bur. Ced. Rpds. & N.	3	Mail.	Pullman Car Co.
Canton-Akron	5	Comb.	St. Louis Car Co.
Canton-Akron	3	Pass.	St. Louis Car Co.
C. H. & D.	250	Box.	Barney & Smith Co.
C. H. & D.	250	Box.	Am. Car & F. Co.
C. R. I. & P.	4	Comb.	Pullman Car Co.
C. R. I. & P.	100	Furn.	Pullman Car Co.
Choc. Ok. & Gulf	50	Flat.	Mt. Vernon Car Co.
Chi. Gt. Westn.	20	Cabooses	So. Baltimore Car Co.
D. L. & W.	100	Box.	Erie Car Co.
Erie R'd	1000	Box.	Pullman Car Co.
Erie R'd	1000	Box.	Am. Car & F. Co.
Florida E. Coast	2	Mail.	Am. Car & F. Co.
Illinois Cent.	300	Box.	Am. Car & F. Co.
Illinois Cent.	500	Coal.	Am. Car & F. Co.
Lehigh Valley	20	Dump.	Am. Car & F. Co.
Lake Erie A. & W.	200	Gond'la.	Am. Car & F. Co.
L. & N.	700	Box.	Own Shops.
L. & N.	250	Flat.	Own Shops.
L. & N.	250	Coal.	Own Shops.
Maine Cent.	100	Box	Laconia Car Co.
Mather Stock Co.	13	Stock.	Ill. C. & Equipt. Co.
Min. & Intern'l.	200	Log Flats.	So. Baltimore C. Co.
Mich. Chem. Co.	10	Frt.	Am. Car & F. Co.
Midland Lin. Oil Co.	4	Tank.	Erie Car Co.
Norwood & St. L.	2	Frt.	Am. Car & F. Co.
N. Orleans & N. W.	4	Coaches.	Am. Car & F. Co.
Nor. Lumber Co.	20	Frt.	Russell W. & F. Co.
Oregon S. Line	300	Gond'la.	Pressed Steel C. Co.
Ozark & Ches. Cent.	60	Box.	Barney & Smith Co.
Ozart & Cher. Cent.	10	Flat.	Barney & Smith Co.
Penna Co.	275	Coal.	Pullman Car Co.
Penna. Rd.	100	Coal.	Pullman Car Co.
Penna Co.	1	Private.	Pullman Car Co.
Penna.	300	Box.	Pressed Steel Car Co.
Pitts. Shaw. & Nor.	300	Coal.	Am. Car & F. Co.
Q. & C.	1	Bag.	Am. Car & F. Co.
Q. & C.	3	Pass.	Am. Car & F. Co.
Rutland	25	Frt.	Am. Car & F. Co.
St. L. & San Fran.	50	Flat.	Am. Car & F. Co.
So. Indiana	50	Box	Barney & Smith Co.
So. Indiana	500	Coal.	Barney & Smith Co.
Steinhardt Co.	12	Tank.	Erie Car Co.
Swift & Co.	200	Refr.	Am. Car & F. Co.
Union Pac.	300	Gond'la.	Pressed Stel Car Co.
Vera Cruz & Pac.	6	Coaches.	Am. Car & F. Co.
Vera Cruz & Pac.	30	Frt.	Am. Car & F. Co.

LOCOMOTIVES

Ordered by	No.	Class	To be built by
Am. Sheet Steel Co.	1	6-w switch	Baldwin Loco. Works.
Cananea Copper Co.	1	10-w.	Baldwin Loco. Works.
Chicago Gt. West.	40	Locos.	Am. Loco. Co.
Col. Fuel & Iron Co.	4	Locos.	Baldwin Loco. Works.
H. B. Perry	2	Locos.	Baldwin Loco. Works.
Kansas City Belt	2	8-w.	Baldwin Loco. Works
Maryland & Penna.	3	Locos.	Am. Loco. Co.
M. S. P. & S. Ste. M.	3	Locos.	
Plant System	3	Locos.	Baldwin Loco. Works.
Penna. Rd.	40	Locos.	Baldwin Loco. Works.
St. Clair M. & St. L. Belt	1	Loco.	Am. Loco. Co.
San Pedro, Los. A. & S. Lake	2	Locos.	Am. Loco. Co.
Vicks. Shrev'pt & Pac.	1	6-w.	Baldwin Loco. Works.
W. R. Grace & Co.	8	Locos.	Am. Loco. Co.

SUPPLY TRADE NOTES

The Universal Car Bearing Company has had its bearings specified on the following cars: Illinois Central, 500 coal, 300 box; Swift & Co., 200 refrigerators, and the Oregon Short Line, 300 steel gondola cars.

H. M. Pflager has resigned the position of general superintendent of the Pullman Company, to become the vice-president and general manager of the American Clock Company.

Barber trucks of the Standard Car Truck Company of Chicago have been specified on 2,000 box cars recently ordered by the Erie, and on 20 locomotives and 20 cabooses for the Chicago Great Western.

L. R. Pomeroy, formerly of the Schenectady Locomotive Works, has been appointed special representative of the railway department of the General Electric Company, with office at 44 Broad street, New York.

It is announced in Franklin, Pa., that a new corporation, to be known as the Galena-Signal Company, has been organized to take over the business and interests of the Galena Oil Company and of the Signal Oil Company. The new corporation will have $2,000,000 of preferred and $8,000,000 of common stock. The officers are as follows: President, Charles Miller; first vice-president, S. A. Megeath; second vice-president, W. E. Heathcote; secretary, F. H. Johnston.

First Aid to the Injured

In the *Windsor Magazine* for July Mr. Berte Livett has a sketch somewhat after the style of the late Charles Keen, of *Punch*. The picture represents some British "navvys;" one of them is lying at full length on the ground, while the other two are sitting beside him, and evidently finishing their mid-day meal. The figure of a sympathetic old lady, with hand upraised in alarmed amazement, is depicted, exclaiming, "Dear, dear, has he hurt himself?" One of the men answers "Aye! fallen down a ditch and broke 'is leg!" The old lady interrupts with, "But aren't you going to take him to the doctor or the hospital?" To which the horrified British workman indignantly replies, "Wot? In 'is dinner hour?"

PAINTS, COLORS, ENAMELS AND VARNISHES

A neat little catalogue, from the Acme White Lead and Color Works, of Detroit, Mich., is, like the *Railroad Digest*, divided into several departments, corresponding to those on a railway. In the catalogue the Motive Power Department takes up four pages, the Car Department has ten pages allotted to it, while the maintenance of Way Department occupies nine pages. Under the first head, Neal's "P. F. S." locomotive system is explained. The letters stand for priming, filling and surfacing. The qualities of Neal's front-end finish, as set forth in the catalogue would no doubt meet with a fireman's approval, as this black finish is intended for all metal surfaces which are subjected to great heat. Following this come samples of locomotive enamels. Among the car department colors are some thirty-six samples, besides others which are only described. The samples include Pullman and Wagner body color, also Pennsylvania and Big Four standard colors. The truck and platform enamels shown include the Pullman, Long Island R. R., Pennsylvania R. R., N. Y. C. & H. R., A. T. & S. F., and the K. C. F. C. & M. railroads. Neal's aluminum enamel is deserving of special mention. It is said to be very durable and is an attractive finish It will stand heat well and is recommended for use on car heaters steam pipes, truss planks, foot rests, racks, etc. The Maintenance of Way has an assortment of colors suitable for use in buildings, signals and outside work. The eight samples of tints for station walls and lavatories are exquisite examples of painters' materials, the shades are very delicate and light. Devil's red for semaphores and signals, as well as for caboose enamel, is a beautiful color, clear and rich. The catalogue is a tasteful little book, and full of matter interesting to the purchaser and user of paint materials on railways. It will be sent on application to those desiring to have a copy.

The daily shipments made by the Pressed Steel Car Company still keep up above the 100 mark. During the week ending September 13, the company shipped 628 cars, an average of 105 cars per day. The company is also making large shipments of truck frames, bolsters, brake beams and other pressed steel specialties.

RAILROAD DIGEST

Formerly The Railroad Car Journal

ENTERED AT THE NEW YORK POST OFFICE AS SECOND-CLASS MATTER.

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THE CAR JOURNAL PUBLISHING COMPANY
At 132 Nassau Street, New York

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EDWARD A. PHILLIPS GEORGE S. HODGINS, Editors

Vol. XI NOVEMBER, 1901 No. 11

Storage Batteries

The Standard Dictionary defines a storage battery as one "consisting usually of lead plates immersed in an electrolyte. A current, as from a dynamo, causes the positive and negative plates to be affected differently, and hence, when it ceases and the proper connections are made, they act like different metals, and set up a reverse current at once on the principle of the ordinary voltaic cell." An electrolyte is a chemical compound which can be decomposed by an electric current. The storage or secondary battery is therefore one in which a chemical compound is decomposed, and its constituents separated or isolated by the action of a current of electricity.

Energy has been defined as the capacity for doing mechanical work. There are two kinds of energy, known respectively as potential and kinetic. When the revolving windlass of a pile-driver has drawn the hammer slowly up the long pair of upright guides, the engine which drove it has done work; it has raised weight through a certain distance against the force of gravity, and when the hammer comes to rest at the top, it has become possessed of an amount of potential energy proportional to the height to which it has been raised. It has the potential energy of position with reference to the pile which stands far down below it. The hammer or weight has now the capacity to do mechanical work. The work of raising it has stored up in it the energy exerted by the engine which pulled it up. When it does fall it gives back, with small frictional loss, all the energy it had received, and the work done by it is evidenced as the pile is driven down under the blow.

A similar expenditure of energy in the form of an electric current acting upon the grids or plates of a storage battery isolates the elements of which it is composed. The active or kinetic energy of the current supplied by an outside agency is expended in tearing molecule from molecule in the chemical compound, just as the energy of the steam engine was expended in raising the pile-driver weight. It is true that the molecules of the compound are ultimately separated only by exceedingly minute distances, but the myriads upon myriads which are thus torn apart, and the enormous chemical attraction of the particles which has to be overcome in so doing, demands a commensurate expenditure of energy. When isolated, the molecules formerly held in close union, possess potential energy, just as did the pile-driver weight at the top of the guides. Instead of being the potential energy of position, as in the former case, the molecules are endowed with the potential energy of chemical separation. When the isolating current is withdrawn and suitable connection is made, the separated molecules begin to leap over the infinitesimal distances which separate them, and clash together in chemical union giving back, with certain losses due to the generation of heat, etc., the amount of energy which had been required to tear them apart. This energy is now in the kinetic or active form, and, as an electric current, does work either in giving out light and heat, or in producing motion in the armature of a motor. Energy may be stored up, but it can never be annihilated, and when stored up may be used gradually, as when a storage battery propels an automobile, or it may be instantaneously expended, as when an explosion of dynamite rends and shatters the solid rock.

Platform Tickets Sold from Coin-in-the-Slot Machines

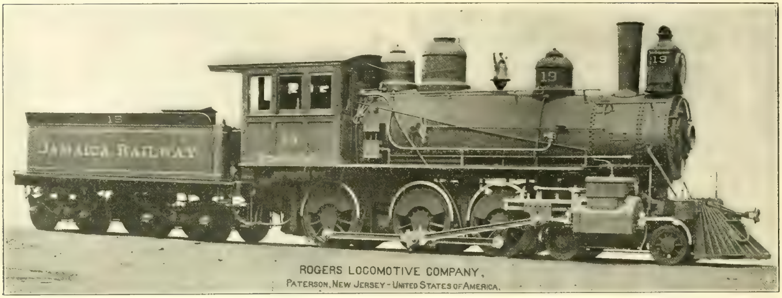
"In Berlin, and vicinity, suburban railway tickets are obtained from slot machines. This system saves the passenger much time, and certainly saves the railroad company at least one window at each ticket office. In all Berlin railway stations, no one is allowed on the platform unless going by train, or is the purchaser of a platform ticket. This ticket costs 10 pfennigs and is also supplied by automatic machines. It may be mentioned that by the sale of these platform tickets the state, which owns the railways, nets over $500,000 a year. During 1900, 30,000,000 tickets were supplied to the public by automatic machines at Berlin city and suburban stations. Few cases of fraud are heard of, for the "nickel" is small and light, and it is difficult to find a substitute for it."

Not long ago one of the New York dailies explained the method adopted by some dishonest persons to cheat the rapid transit roads in and about this city during the rush hours. One way was for the dishonest person merely to make the motion of depositing a ticket and escape detection in the crowd. Another way was to buy a string of tickets, say a dozen, and cut each ticket off a little short of its true length and so gain one on the total number, detection being difficult in a crowd. The nickel-in-the-slot machine would prevent such methods of fraud.

An automatic machine, it seems to us, could be devised where the loss to the railway company might be reduced to a minimum. If such a machine was available, it would, no doubt, be a great convenience to the public, and a source of revenue to the railway. As it is now, in large stations where the non-traveling public is prevented from going on the platform, a man cannot carry a small piece of hand baggage to or from the car for a lady. He has to part from her at the gate, if she is traveling, and if he is meeting a friend, he has to wait at the gate until his friend, perhaps laden with parcels, passes through. It may be argued that porters are always on hand to attend to such matters. Even where that is the case, it may not be as satisfactory, and often is not, as "doing it oneself." Where the porter is, there is the tip also. Platform tickets sold from nickel-in-the-slot machines, would have the effect of discouraging the presence on the platform of people who have no business there—thus crowding would be avoided. There would be less "tipping" required, a state of affairs the public would appreciate. A part of the tip money, now paid out, would find its way into the pocket of the company, not in the form of a gratuity, but with a legitimate *quid pro quo* in the shape of permission to pass inside the railing, and either see one's friend off, or meet him or her in the oldfashioned, satisfactory way.

Best Material For Crank Pins

Prof. A. L. Colby, of the Bethlehem Steel Co., at the Master Mechanics' Convention held last June, was asked to speak for a few minutes on the subject of nickel steel for crank pins. He said his company had sold a large number of nickel steel forgings to the railways and locomotive works in the United States for the purpose of making crank pins, and they had yet to hear of any failures. Nickel steel has a high elastic limit and is therefore peculiarly fitted for use where alternating stresses of tension and compression are severe. Nickel in the steel increases the elastic limit, which property makes it very satisfactory for all sorts of severe service. It cannot, for that reason, be easily tired out. Nickel is allied to iron in physical properties. It is found in nature along with iron and alloys well with it. Nature as it were pointed to the use of both in combination. For crank pin service it is a most highly satisfactory material.



Rogers Locomotives in Jamaica

The American built compound engines which surpassed in speed and tractive power the new British engines on the Jamaican Railway, in some tests recently conducted by English experts, were built in 1895 by the Rogers Locomotive Works of Paterson, N. J.

The road over which these engines are operated is full of grades and curves, with often a combination of both. The success of these engines is no doubt due to the fact they had been intelligently designed for the work they had to do and were admirably suited to the road over which they had to run.

The non-technical press of the country often appears to think that there is some subtle inherent superiority in American-made engines, whereby steel is stronger and steam hotter with them than with engines built in other countries, and that failure to achieve success in competition is more or less due to prejudice existing in the minds of those who operate our engines abroad.

It is probable that the success of these Rogers' engines was due, in part, to the fact that though of the 4-6-0 type, the truck did somewhat less guiding than usually falls to the lot of a truck under a ten-wheel engine. This difference no doubt reduced the resistance experienced on sharp curves.

We do not, for a moment, say that this is the whole explanation, nor do we doubt that there were many other points of excellence which contributed to the result, but we believe that the conditions of service had somehow been more accurately gauged in designing these engines, than that displayed in the construction of the rival machines. That is the pivotal fact upon which the scale turns in our favor or against us, when in competition with builders in other countries.

Mr. R. Wells, general manager of the Rogers Works, has given us a description of the truck used under these engines. He says: "The arrangement of the trucks under the Jamaica engines is shown in plan, Fig. 1. The centre or radial pin is at A. The plate on which the weight of the front of the engine rests is at B. The pin A is about five inches back of the rear truck axle. Fig. 2 is a cross section of the plate B, and the male part C resting on it. C is attached to the lower face of the cylinder saddle, and its lower face rests on B. The faces of B and C are inclined from the sides towards the centre line D at an angle of 1 in 16. The plate B has a flange around it, as shown; sufficient cheap oil is kept in it to submerge the faces of B and C.

When the forward wheels of the truck pass on to a curve, plate B is, of course, carried in the direction of the curve, and C therefore slides from its central position upward on the incline and so allows the truck to adjust itself to the curve. The faces of B and C are inclined only enough to cause the truck to assume its central position practically of its own accord on again passing to a straight track, at the same time it offers but slight resistance to the lateral movement of the truck when adjusting itself to the curves. The pin A is slightly behind the rear axle of the truck. When the front wheels of the truck, in following the curve, move towards E, for instance, the rear

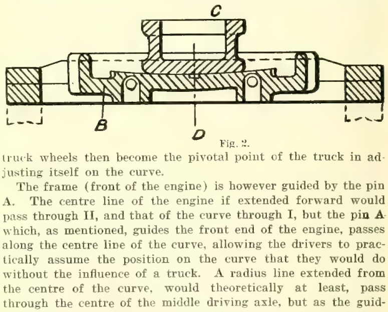
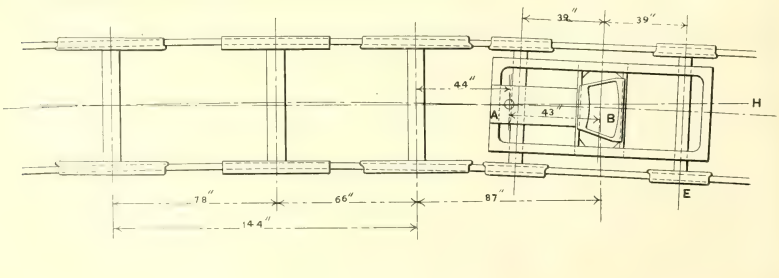
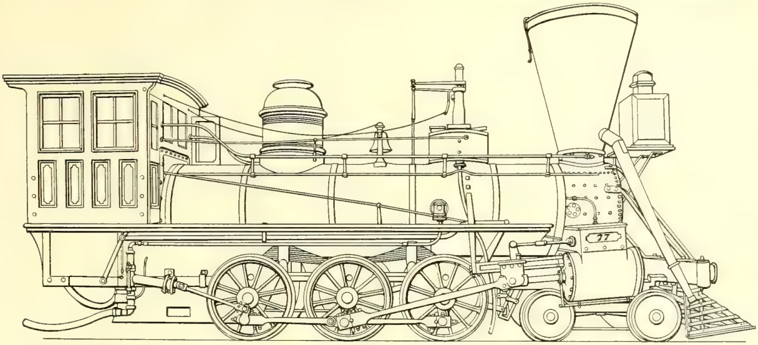


Fig. 2.

truck wheels then become the pivotal point of the truck in adjusting itself on the curve.

The frame (front of the engine) is however guided by the pin A. The centre line of the engine if extended forward would pass through H, and that of the curve through I, but the pin A which, as mentioned, guides the front end of the engine, passes along the centre line of the curve, allowing the drivers to practically assume the position on the curve that they would do without the influence of a truck. A radius line extended from the centre of the curve, would theoretically at least, pass through the centre of the middle driving axle, but as the guiding point is at A, the engine would, of course, be steadied at that point, and the drivers would be less liable to the side swing that six-driver engines have without a truck."





A Ten-Wheel Locomotive of 1853

It is well known that the ten-wheel locomotive is not a new thing, but an arrangement that has come and gone and come again, like some fashions. The engine here illustrated in outline is one that was built in 1853, for what is now the Pennsylvania R. R. The enormous, flaring stack at once bespeaks the wood burner, and its long chute, extending down to the end of the bumper, can hardly be called an ornamental appendage. Still, though usually in a very battered and dilapidated condition, it served its purpose of a cinder discharge better than a mere opening that discharged over the whole front end of the locomotive.

The type of guides and crosshead have quite a modern appearance, except in the matter of size; but the round connecting rod and the turned, though flattened, side rods are evidences of a past design that has gone, never to return.

The working of the pump from a return crank on the rear driver is also of the past, though 1853 is by no measure the latest date of its application.

The arrangement of the springs is especially worthy of attention. It will be seen that the weight is equalized over the three driving wheels by the springs without the use of an intermediate equalizer or other connection. The method is the same as that now used on heavy six-wheeled trucks.

The bunching of the wheels in order to secure a short, rigid wheel base involves a long overhang at the back, and it seems as though it must, in spite of the spring arrangement, have put an excessive weight on the rear drivers.

The low, straight top boiler is also one of the interesting features, and there is probably no doubt that at the time of its construction, this engine was considered a giant among its fellows, and the master mechanics of the day were wondering to what lengths the excessive weights of locomotives would be carried.

Draw Gear Tests

A circular issued from the office of the secretary of the M. C. B. Association gives information regarding the tests of draw gear to be undertaken by the committee of the association for that purpose. The general plan of the tests is briefly as follows:

"The tests of the strength and capacity of draft gear must necessarily be competitive tests involving commercial interests, and for that reason, if for no other, it is essential that the conditions of the tests be alike for all, and further, that the conditions be accurately known. In round tests of draft gear, many factors affecting the results in a large way are beyond control and the measurements cannot be made with any degree of accuracy. If tests of the strength of two kinds of draft gear were made on the road, the results would be indefinite. No one could say positively whether or not the conditions were enough at variance to account for a difference in results, or whether one gear was really superior to another. Where commercial interests are involved, this uncertainty is sure to lead to endless discussion and discredit the whole work. As road tests of draft gear are so indefinite and require so much time and expense to conduct them properly, it is proposed to make use of road tests only where absolutely necessary, and then to eliminate the commercial interests so far as possible. For present purposes road tests seem superfluous.

"The general plan is, therefore, to show the relative strength of different gears which may be submitted by drop tests and by pulling and compression tests in a tensile testing machine of large capacity. These tests will be expected to show the yielding resistance provided in draw gear and the relative standing of the different constructions under steady pulls and under shocks."

New Railroad Club

Local railroad and railroad supply men recently formed the "Railway Club of Pittsburg." The organization was effected at an afternoon meeting in the Hotel Lincoln. Just 50 names were enrolled, and nearly that number of members were at the gathering.

The meeting to organize the club was called by J. H. McConnell, general manager of the Pittsburg works of the American Locomotive Company, D. F. Crawford, superintendent of motive power of the northwest system of the Pennsylvania lines west of Pittsburg; L. H. Turner, superintendent of motive power of the Pittsburg & Lake Erie, and J. D. McIlwain, president of J. D. McIlwain & Co., sales agents for railroad supplies.

Cheap Electrical Transportation

An exchange tells us that the success of the "Tuppeny Tube," has been so pronounced in London, that cheaper electrical underground rapid transit may yet be looked for. It expects soon to see the "Penny Pipe," which will no doubt be followed by the "Farthing Funnel."

An English paper publishes an interesting yarn about a practical joke played upon a railway passenger by his traveling companions. One of them stole the victim's ticket, and then they all persuaded him that the best way to avoid unpleasantness with the ticket collector was to hide under the seat. When the ticket collector received one ticket more than the number called for, he wanted explanations. They were at once forthcoming: "Oh, the other belongs to the gentleman under the seat. He would travel like that; we don't know why."

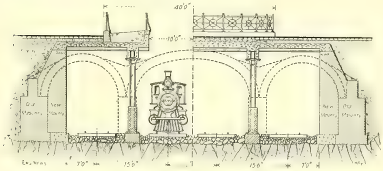
The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Proposed Changes in the Park Avenue Tunnel

Engineering News, Oct. 17, 1901, p. 290.

Plans have been recently submitted by the N. Y. C. & H. R. R'd to the New York Board of Health outlining changes in the tunnel through which the railways reach the Grand Central Station at 42d street. In the illustration the dotted lines indicate the existing construction of stone masonry. It is proposed to remove all masonry except the vertical portions of the outside walls. These will be strengthened by additional masonry to make vertical retaining walls up to the level of the roof of the tunnel. The roof will be formed of concrete carried by I-beams resting at their outer ends upon these retaining walls, and near



the line of the present intermediate walls, upon longitudinal girders supported by a line of steel columns with foundations at floor level. The roof beams will be spaced about 3 ft. to 4 ft. on centers, and the columns 17 ft. in the direction of the length of the tunnel. The roof construction will extend a short distance beyond the line of the columns, leaving an open space in the center considerably wider than the openings in the roof of the present tunnel. Between the columns in the tunnel a wall of masonry will be carried up to a height of 6 ft. as a guard to protect the columns in case of derailment.

The proposal is for the present to reconstruct the tunnel according to this plan for only a comparatively short distance. Ten blocks is contemplated as an experiment. Should the construction satisfy all requirements, it would then be carried out on the remaining sections of the tunnel.

The Derail; Past, Present and Future

Railroad Gazette, Oct. 11, 1901, p. 696.

This paper is by Mr. E. D. Wileman. After giving some details of the evolution of the derail from the old tie chained to the rails of a siding to prevent side-tracked cars from fouling the main line, he comes to present-day appliances. He says, some claim that derails cause more damage than they prevent, and that properly placed signals with rigidly enforced discipline, should be entirely sufficient. The fact that derails do cause damage proves that signals are over-run. It would be difficult to devise any sharper discipline than an open derail. As yet the majority maintain that a train having been given right of way over a crossing is entitled to all the protection, physical as well as moral, that mechanical science can provide, chief of which is a well constructed and properly placed derail.

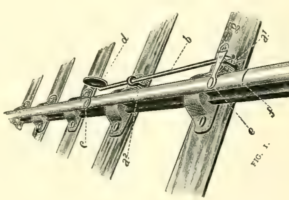
A perfect derail should, 1, when cleared for traffic, present as nearly as possible a solid, unbroken track. 2, When closed it should be certain of deflecting anything that might run on to it, and it should do so with the least possible interference with the solidity of the track. 3, It should render it practically impossible for any derailed engine or car to reach the protected point. 4, It should, as far as possible, secure the safety of the derailed train or engine, thus enabling the engineer to remain at his post, and fully utilize all the means at his command to quicken the stop. 5, It should, as far as possible, keep the derailed train or engine in such condition and position that it may be quickly returned to the track and be ready to proceed.

It is suggested that a suitably sized channel iron properly fastened, extending from the heel of the derail, be provided. It should be not less than 5 inches deep, and filled with sand, coated with oil. Should this be too expensive, a light rail, say 4 inches, placed in a proper sized wooden trough made deep enough to insure at least 1 1-2 in. of sand over the rail, would form an economical substitute.

Detonator Economiser

Transport (London), Oct. 11, 1901, p. 299.

In the recent general report of the Board of Trade on railway accidents of 1900 attention is directed to fog-signalling appliances. The cost of signalling in a fog of six hours' duration over nine miles of urban and suburban railway was shown to be in all £35 8s. The cost of the detonators alone was £16 10s. It is not surprising that the Detonator Economiser, a joint invention of two practical railway men, should be welcomed by several leading railways. The invention is designed to avoid the waste of using two detonators to ensure one explosion.



This practice is resorted to through fear that a single detonator may be removed without explosion, by a skidded wheel. Messrs. Bowden and Partridge's device, while it places two detonators on the rail, and insures the second detonator being held there securely, prevents the waste of the second if the first be effective. The essential feature of the machine is to put two detonators on the rail, and to use the force of the explosion of the first to withdraw the second from the rail before the wheel reaches it. In the figure *a* 1 and *a* 2 are two bearings for bar *b*; *c* is the first detonator, placed in the usual manner on the rail, and

is intended to be exploded; *d* is an impact plate fixed on bar *b*, and *c* is a second detonator clipped on a tinholder *f*, which is swivelled on attachment *g*. When the first detonator *c* is exploded the shock throws plate *d* back, operating bar *b* and causing crank attachment *g* to draw the second detonator *e* away from the rail before the advancing wheel can reach it. By the use of the "economiser" nearly 50 per cent. of the detonators consumed under the old system are saved.

Steel Ties on the Lake Shore

Railway and Engineering Review, Sept. 14, 1901, p. 608.

The Lake Shore and Michigan Southern Ry. has been experimenting with steel ties, made of worn out steel rails weighing 65 lbs. per yard. These ties are of the Buhrer design. The experiment began about sixteen months ago, by laying a short stretch of main track with these ties in Sandusky, Ohio. Early this season 300 ft. of track on a curve about 2 1-2 miles east of Sandusky was laid with the ties at two feet centers. At this point the trains all run at a high rate of speed, and it was expected that if the ties could hold the track in good service, alignment and gauge, the success of the tie, so far as its serviceability would be demonstrated. The performance of the ties is now reported to be eminently satisfactory. It is stated that less surfacing has been done on the section of track laid with steel ties. The *Review* goes on to say that the fact that a steel tie has been found which can be thoroughly and readily tamped, at the usual cost, is a matter of importance. It has pointed out that the steel tie of inverted trough section is not well adapted to the conditions of track support, and to the operations of track surfacing, and the prediction is made that the flat-bottom tie will not be improved upon in these respects. The Buhrer tie seems to permit of surfacing at moderate expense, and the prospect of utilizing worn out rails for the support of the track is certainly an enticing proposition, provided the cost of the tie can be kept within a reasonable limit.

[For description of the tie designed by Mr. C. Buhrer, roadmaster L. S. & M. S. Ry., see DIGEST for January, 1901, p. 30. —EDS. RAILROAD DIGEST.]

Expense of Crossing Safeguards in Michigan

Street Railway Journal, July 13, 1901, p. 66.

An important decision was recently given by the Supreme Court of the State of Michigan in the case of the Detroit, Fort Wayne & Belle Isle Railway Company vs. the Commissioner of Railroads. In this case an order was issued by the Commissioner for the building of safety gates at the Clark Avenue crossing of the tracks of the Union Terminal Association in the city of Detroit, and for derailers in the tracks of the street railway company, such gates and derailers to be worked by a watchman from a tower, and the expense of the construction, maintenance and operation of the appliance was to be divided between the companies. The street railway company claimed that as its line was built before the building of the railroad at that point, it had secured a vested right, and that it could not be made to bear any expense made necessary by conditions created after its line had been built, and for which it was in no way responsible. The court held that under the statute within which the order was made, the apportioning of the expense between the companies affected, incident to safeguarding crossings, was a valid enactment. A dissenting opinion was filed by Judge Grant, in which he held that the use of a street by a street railway company was a strictly legitimate use, and that it should no more be required to pay any part of the necessary expense for the protection of railroad crossings than any other travelers using vehicles on the street.

Inconvenient Water Spouts

Railway and Locomotive Engineering, Sept., 1901, p. 394.

We notice in our travels that at water tanks some passenger trains make two stops, one so that the spout can be swung around and miss the top of the tender or end of the baggage car, and after pulling up six or eight feet so the spout will come over the water hole in the tender, another stop is made. This is because the water spouts are too low to clear the side of the tender with coal heaped up, although they will clear the back end of the tender.

If the head of the water-supply department, no matter who he is, had to ride in the last car in the train along with the general manager and make a truthful explanation of why two stops were necessary to take water, he would probably put the blame on the high tenders.

Now, the high tenders are not built to suit the water spouts, but are high up because the heavy fast trains cannot make time with the old-fashioned tenders of small capacity.

The water-supply department should adopt up-to-date appliances, and so give the road concerned, a better reputation and cut out numerous emergency applications of the air brake at slow speed, which are charged up to the engineer drawing the train, when they should be charged to defective water cranes.

Locomotive Equipment, Appliances and Related Matters

Locomotive Boiler Explosion

Power, October, 1901, p. 4.

A passenger engine on the Western & Atlantic R.R. was wrecked on August 2 by the blowing out of the crown sheet and side of the firebox. At the time of the explosion speed had been reduced to six miles an hour. From the position of the wrecked engine and tender, the force of the explosion had evidently thrown the engine high in the air, allowing the cars to pass under it. The momentum of the train carried the engine 80 feet beyond the spot where the explosion occurred. One side of the firebox and probably one-third of the crown sheet was blown backward and to the left of the spot where the explosion occurred, falling fully 45 feet from the track. This was the second trip for this engine after being in the shop. The cause of the explosion was evidently a weak crown sheet, as all visible stay bolts were in excellent condition, not one being broken while dozens were bent.

Roundhouse Organization

Railway and Locomotive Engineering, Oct., 1901, p. 438.

It is everywhere conceded that without an efficient and systematic roundhouse management the pooling system can never be a success, but that statement does not go quite far enough. It should say it will save money and give satisfaction with either pooled or assigned engines.

The precept that "A stitch in time saves nine," is nowhere of more importance than in the running repairs of locomotives. The roundhouse is the first place to put it in practice, and nowhere in the locomotive department should it be more closely followed up if engine failures are to be kept at a minimum.

In a measure, the motive-power officers have been at fault in this matter; for, in addition to trying to get along with the crudest appliances for doing work at outside points, with a view to having all the running repairs done close to the main shops, they have not always selected the proper men to do the work.

Nowadays, with the immense engines and the heavy service demanded of them, something more is needed at a division or turning point than a turntable, cinder pit and water tank with washout hose. The time was when the man in charge as foreman was a sort of hostler, call-boy and roundhouse machinist all in one, and if he was anything of an engineer, he was relegated to some out-of-the-way point, and left there.

To-day a roundhouse foreman has so many calls for special knowledge that he needs special training. We believe it will pay big interest on the investment to train up men specially in this line of work and promote them from one engine-house to the charge of a larger one with better salary. If bright, intelligent young men are given a chance to learn this branch of railroading, they will make their mark for efficient service.

Of course they should have served their time as apprentices in the back shop. This should be followed by some months'

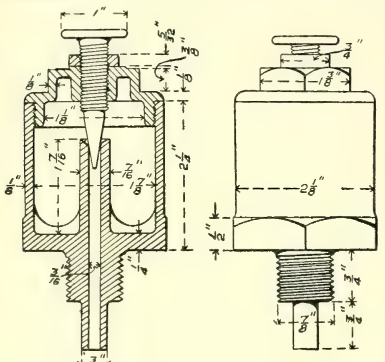
service as assistant in one of the large engine-houses, in various capacities, till they get an insight into the whole business. Keeping a locomotive in repair, and handling a train out on the road are getting to be two widely different branches of the work, so that the material from which foremen are now made is more often taken from the ranks of machinists than from enginemen. Foremen usually receive less per month than the good-paying runs yield to the engineer.

Where power is hard run and poorly looked after in the matter of overloading, bad coal, and water which causes considerable boiler work, the roundhouse force can make or break the good record of a master mechanic, just according to their ability and training. Many up-to-date motive-power officers appreciate this fact and look after the roundhouse organization as closely as that of the back shop; they find it pays.

Malleable Iron Oil Cup, M., St. P. & S. Ste. M.

American Engineer and Railroad Journal, Aug., 1901, p. 251.

Theft and breakage of brass oil cups is leading many to the use of cheaper materials. The description of the malleable iron oil cup devised by Mr. McIntosh, of the Central Railroad of New Jersey, illustrated on page 323 of our October number of last year, attracted the attention of Mr. T. A. Foque, Mechanical Superintendent of the "Soo" Line, and led him to send us a drawing of a design which seems to have excellent features. This cup has a regulating needle similar to that of the New Jersey Central, but Mr. Foque has made it accessible from the outside of the oil cup without requiring



the cap to be taken off in order to regulate the feed. It is held in the desired position by the lock put on the top of the cup. This design has the additional advantage of placing the wrench at the bottom of the cup instead of the top, when screwing it into place. The desire to secure oil cups from loosening often results in too vigorous use of the wrench and the weakening of the cup if turned from the top, unless it is made very strongly. Mr. Foque says that losses of oil cups by breakage and loosening from the rods are now almost unknown. His oil cup is not large, but it is found to be ample for all conditions of service.

[The New Jersey Central cup was referred to on page 22 of the January, 1901, *Digest*.—EDS. RAILROAD DIGEST.]

Side Rods on New Engines

Railway and Locomotive Engineering, Sept., 1901, p. 414.

The practice of shipping locomotives from the builders' works to destination with the side rods taken down, seems to have given way to another plan whch permits the side rods to remain up while the engine is *en route*. There are several goods points about this latter practice. There is less labor required in not having to take down the rods at the works, pack them away in the tender and take them out at destination. This does away also with the necessity for jacking up the engine in order that the wheels may be turned round to a suitable position where the rods may be attached to the pins. The bearings in the side rod brasses are also worn down by the time the engine reaches its destination; but it is doubtful whether it would not be disadvantageous to attempt to bring the brasses to a bearing while the engine is *en route*. It might seem preferable to wait until after the engine had been set up, when proper time and facilities can be had for giving the brasses the attention they need. A side rod brass, once heated, is very liable to warp and twist on the pin, thereby unfitting it for service until after it has been taken down, filed and again fitted to the pin. This undesirable state of affairs is more likely to happen if the brass should get hot *en route* than if it occurred in the yard when the engine was on its trial trip. There is danger of putting an undue strain on the pins of the driving wheels if the side rods be left up and the wedges be left down, and the side rod brasses be keyed up very loosely. However, with the side rod brasses keyed up free and the wedges slightly down, there would seem to be no difficulty in shipping new locomotives from the works with side rods up.

The question of leaving up the side rods, was voted on and carried, and it is therefore now a recommendation of the Master Mechanics' Association.

Bad Effects of Oil in Boilers

Steam Engineering, August, 1901, p. 358.

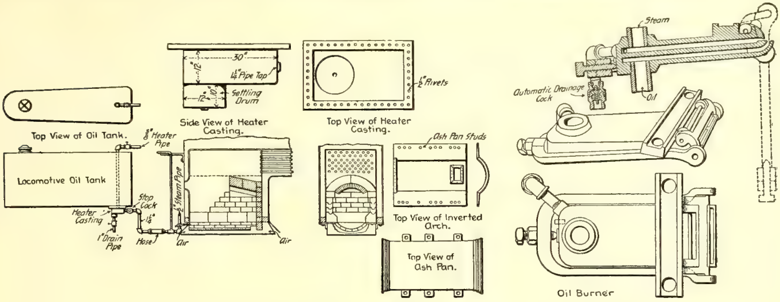
Mr. J. B. Lewis contributes this article. He deals primarily with the question of oil in the feed water, gained by the condensation of exhaust steam. (In view of the fact that black oil is often put into a locomotive boiler after it has been washed out, his remarks are of interest.—Eds.) He says: The nature and extent of the danger from oil in the water of a boiler is not so generally appreciated as might be desired. Suppose water contains sulphate of lime, and to soften the scale soda ash is introduced at regular intervals. If the water is contaminated with oil, the result will be the formation of soap suds, and it will manifest itself as a badly foaming boiler. When oil enters a boiler the small particles coalesce to form an oily scum, or float about in separate drops. When they come in contact with solid particles of sediment they adhere, and form an oily coat. In this way the oil is loaded until it is easily carried along by the currents of water and deposited on the surface of the shell and flues. These deposits are poor conductors of heat, and experience has shown that when they attain a thickness of 1-16 of an inch, the plate is endangered. If only 1-64 in. of this oily scale collects directly over the fire, it will be sufficient to raise the temperature of the plate until the oily deposit begins to decompose, giving off gasses which transform the layers into a spongy mass, perhaps 1-8 in. thick. This porous mass is the best non-conductor imaginable. The plate may thus become overheated and collapse. Sometimes the oil coalesces into a sort of floating pan-cake, which, when sufficiently loaded with lime, sinks and locates itself upon a flue or sheet.

It may be mentioned that, among stationary plants, the one for the Manhattan Elevated Ry., in New York, is equipped with jet condensers, which necessitate the purchase of clean water from the city. The reason given for this procedure is as follows: "The state of the art with regard to the continuous use of water in the boilers is such that the designers prefer to use the jet condenser," involving as it does a large expense for city water.

Coke Fuel on the C. H. & D.

Railway World, August 3, 1901, p. 871.

An experiment with gas coke as fuel for locomotives was recently made by the Cincinnati, Hamilton & Dayton Railroad, and it is understood, unofficially, that the result of the experiment was highly satisfactory to the officers of the road. The experiment necessitated but slight change in the firebox, and the trip from Cincinnati to Dayton was entirely free from the smoke and dust produced by the use of soft coal. The results of the experiment, as regards the steam providing quality of the coke, and the quantity used in traveling per mile, will be calculated and submitted at once to the officers of the road.



Apparatus for Burning Crude Oil—Los Angeles Terminal Railway.

Best's Crude Oil Burner

American Engineer and Railroad Journal, Sep., 1901, p. 293.

Instead of the usual arrangement, the oil orifice of this burner is below the stem opening. In order to guard against clogging the burner the nozzle may be easily opened for cleaning. At the back end of the burner an automatic drainage cock is fitted to prevent an accumulation of water in the nozzle when the steam valve is closed. If water should be thrown against the hot brick arch the latter would suffer considerable damage.

In the firebox an inverted arch is placed. It has an opening for air back of the front firebrick wall. The arch is lined with firebrick where the flame reaches it, and it is bound with angles to prevent it from breaking down. These bricks are 9 ins. thick and made specially for this purpose. The location of the arch with reference to the flues and its length are indicated in a general way in the illustration.

Oil is carried in a tank in the coal space of the tender and flows by gravity to the burner. In passing from the tank into the delivery pipe, the oil goes through a cast iron well under the tank, where it is heated by steam from the boiler. This insures a continuous and ready supply of oil by heating it only as it is used. This well also traps the water that may be in the oil before it goes to the burner.

TEST ON THE INTERNATIONAL & GREAT NORTHERN.

Mr. W. B. Chenoweth, Mechanical Engineer has sent the following communication:

I give, below, the performance of an 85-ton engine with 20 by 28-inch cylinders, which has been in service the past two weeks and is equipped with Mr. W. N. Best's oil burning apparatus, using Beaumont oil. This engine makes a 308-mile run and the average coal formerly consumed was 17¾ tons, or 35,500 lbs.; this means 17 1-5 miles per ton of coal. On the same run with the same tonnage the engine is now making the 308 miles on 17,640 lbs. of oil, a difference of 17,860 lbs in favor of oil. According to Rankine, the perfect combustion of 1 lb. of bituminous coal is equal to 15,887 heat units. The perfect combustion of 1 lb. of crude oil equals 21,735 heat units, which shows the great advantage of oil over coal.

With this engine the question was not how much steam could be made, but how much steam could be used. The engine carries 200-lb. pressure and it could be maintained under all conditions on the trip. In going up a 1 per cent. grade with a 3 deg. curve with 900 tons of freight the engine could be easily popped off while both injectors were working. There was absolutely no smoke and no odor arising from the burning oil. It is argued by some that the intense heat produced will shorten the life of the firebox, but the argument is not borne out by experience. It is not heat which injures a firebox; it is cold air which does the mischief. Where oil is used the fire door is not opened.

The Performance Sheet That Lies

Railway and Locomotive Engineering, Oct., 1901, p. 440.

There are two subjects that seem to be perennially before railroad men for discussion without any apparent progress being made toward an agreement. One is concerning the method of keeping motive-power accounts to show the actual cost for moving freight and passengers, and the establishing of a uniform system of tonnage rating of locomotives. When we find the monthly reports of locomotive performance that come from roads operated under similar conditions varying in the expense per engine-mile 5 or 10 per cent., our curiosity is naturally aroused to find out in what way the railroad making the best showing brings about the results. At one time that we made investigation of the annual reports of different railroad companies which performed the moving of freight over roads with similar physical conditions, we found that some of the companies that reported the lower figures of expense per engine-mile were among the highest in the cost for ton-mileage. Those in charge took advantage of the variables and gave the engines credit for work they did not perform.

Committees have repeatedly been appointed by the M. M. Association to report on a uniform system of keeping locomotive accounts. Some good practical recommendations have been made, but members who wished to indicate that they made their engines work more cheaply than those of their neighbors, continued to use figures that always lied.

A case is cited where a certain master mechanic built up a reputation for himself by making his monthly performance sheets, celebrated for low cost per mile run. A neighboring M. M. was, in consequence, harassed by his general manager, who constantly made odious comparisons. A little patient labor on the part of the man who appeared to disadvantage soon enabled him to prove, by reference to tonnage handled that he was doing his work more cheaply than the other. The result was disastrous to the man of false figures.

Cast Steel Locomotive Frames

Railroad Gazette, Sep., 1901, p. 655.

In regard to comparative cost of wrought iron and cast steel frames the situation may be stated thus: In large locomotive building establishments having large forge shops provided with adequate appliances and working force, frames of comparatively small locomotives, many of which are extremely simple in design, can be forged in iron, cheaper than they can be cast in steel. The reason is obvious. The welds are light and easily made. The hammer-shop force is kept at work, often doing this frame work in intervals which otherwise involve partial inactivity of the forge plant.

When heavy frames are to be made, involving greater difficulties of designs and considerable areas in cross-section, cast steel offers relief from some of the most difficult and expensive operations. The heavier frames can be made not

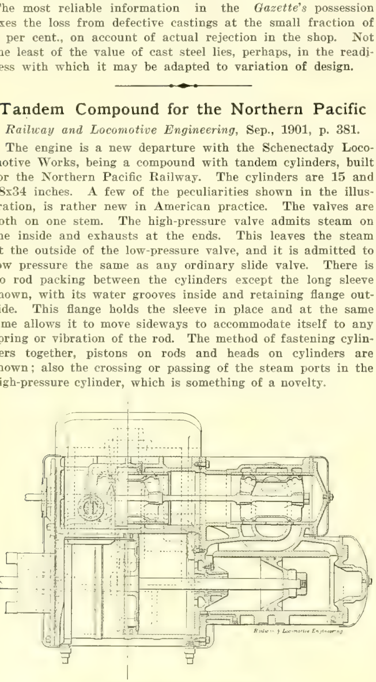
only better but cheaper in cast steel. How much cheaper pound for pound cannot be stated in a way to cover individual designs because each design has its own difficulties.

In trying to decide where to discard the iron frame and use cast steel, the Baldwin Locomotive Works has tentatively fixed the line at locomotives having cylinders 20 inches in diameter or larger. Out of 874 engines built at these works from Jan. 1 to Aug. 31 this year, 550 of them had cylinders 20 in. diameter or over. Of the 550 locomotives 336 have cast steel frames, thus showing that over 61 per cent. of the locomotives, which for present purposes are classed as "heavy," have cast steel frames. Of the 336 engines with cast steel frames, 64 went to the B. & O. R'd, 64 went to the Pennsylvania system, 66 were for the Union Pacific, 50 for the Philadelphia & Reading, 15 for the C. B. & Q., 40 for the Lehigh Valley, 32 for the Erie and 5 for the Rio Grande Western. The most reliable information in the *Gazette's* possession fixes the loss from defective castings at the small fraction of 1 per cent., on account of actual rejection in the shop. Not the least of the value of cast steel lies, perhaps, in the readiness with which it may be adapted to variation of design.

Tandem Compound for the Northern Pacific

Railway and Locomotive Engineering, Sep., 1901, p. 381.

The engine is a new departure with the Schenectady Locomotive Works, being a compound with tandem cylinders, built for the Northern Pacific Railway. The cylinders are 15 and 18x34 inches. A few of the peculiarities shown in the illustration, is rather new in American practice. The valves are both on one stem. The high-pressure valve admits steam on the inside and exhausts at the ends. This leaves the steam at the outside of the low-pressure valve, and it is admitted to low pressure the same as any ordinary slide valve. There is no rod packing between the cylinders except the long sleeve shown, with its water grooves inside and retaining flange outside. This flange holds the sleeve in place and at the same time allows it to move sideways to accommodate itself to any spring or vibration of the rod. The method of fastening cylinders together, pistons on rods and heads on cylinders are shown; also the crossing or passing of the steam ports in the high-pressure cylinder, which is something of a novelty.



TANDEM CYLINDER ARRANGEMENT

The engine weighs 198,000 pounds in working order, of which 175,000 pounds are on the drivers. The driving wheel-base is 17 feet, and the total wheel-base 25 feet 9 inches. The wheels are 63 inches diameter and have cast-steel centers. The main driving-wheel box is of cast steel and the others of steeled cast iron. The main driving axle journals are 9½x11 inches; the the others are 9x11 inches. The main crank pin journals are 7¾x5¼, the others 6½x7 inches.

The boiler is of the wagon-top variety, with wide firebox. It is 66½ inches diameter at the first ring and carries a working pressure of 225 pounds per square inch. The firebox is 100 1-16 inches long, 75¼ inches wide, and has a depth varying from 59¾ to 70¾ inches. The water space around the firebox ranges from 3½ to 6 inches.

The crown sheet is supported by Taylor iron radial stays, 1⅛ inches diameter. The other stay-bolts are also Taylor iron, 1 inch diameter. There are 338 2-inch tubes, 16 feet long. The brick arch is supported by water tubes. The boiler tubes provide 2,815.03 sq. ft., water tubes 26.43, and firebox 155.64, making a total of 2997.1 square feet of heating surface. The grate area is 52.29 square feet. The boiler is fed by two Hancock inspirators, No. 10. The tender holds 5,500 U. S. gallons and 10 tons of coal.

Part of the equipment is: Westinghouse-American combined brake on drivers, tender and for train; two 9½-inch air pumps with duplex governors; Le Chatelier water brake on cylinders: "Little Giant" blow-off cock; two Michigan lubricators, one double, one triple; sand blast, Leach D-2, double; magnesia sectional lagging; one Ashcroft steam gage; Western bell-ringer.

Compound Locomotives on the North-Eastern Railway of England

Engineering (London), July 19, 1901, p. 92.

Mr. J. W. Twinberrow, of Newcastle-on-Tyne, writes to the editor of *Engineering* regarding the three-cylinder compound locomotive recently constructed for the North-Eastern Railway, as follows: Special interest attaches to the three-cylinder locomotive for the North-Eastern Railway, because the latter road has had more experience in the working of two-cylinder compounds than any other British railway. The new design may in consequence be looked upon as an evolution, in the production of which the disadvantages experienced in working the older types have been eliminated, whilst the economy of fuel has been extended to a wider range of working conditions. The principal causes which have hitherto retarded acceptance of the compound locomotive as an entire commercial success are, perhaps, slow acceleration, lack of handiness in starting and switching, and imperfect balance of the moving parts. The four-cylinder engine has been accepted on the Continent as affording the best solution of the problem; but the arrangements for securing prompt and rapid starting with heavy loads necessitate the manipulation of three-way cycles, or their equivalent, and are, therefore, slower than the ingenious automatic reducing and equilibrium valves of Mr. Smith's design. The balancing of a four-cylinder engine is not necessarily more perfect than that of a three-cylinder machine. The primary longitudinal forces alone are balanced, whilst the couples are neglected. The same result may be achieved with greater simplicity by the use of three cylinders when the moving parts of equal weight are coupled to cranks at 120 degrees apart. It is doubtful whether the effects of unbalanced couples on a heavy engine with long wheel base are sufficiently serious to warrant additional complications in balancing. The presence of three valve gears between the frames prejudicially affects the length available for main and crank bearings, and increases the difficulty of access. Walschaert valve gear, driven from the outside crank pins, would be preferable, and it would allow the low-pressure cylinders to drive the trailing pair of coupled wheels in place of connecting all the cylinders to one axle. Recent troubles with fire-boxes and the successful working of water tubes in the fire-box encourage the suggestion that this portion of the boiler might be constructed wholly of tubular elements.

Vauclain Compound Locomotive

Proceedings, Pacific Coast Ry. Club, Aug. 17, 1901, p. 113.

Mr. C. T. Noyse read a paper on this subject, in which he said that, in the two-cylinder compound, probably the greatest difficulty has been to so proportion the diameter of the cylinders, and arrange the valve gear, that equal work in the two cylinders might result at each point of cut-off. The result cannot be obtained from the cylinders alone. They may be proportioned so as to give equal work at full stroke, and vary greatly at other points; in fact, if they are so proportioned as to give equal work at full stroke, the work will vary in a constantly increasing ratio, as a shorter cut-

off is used, the least work being done by the high-pressure cylinder.

With regard to three-cylinder compounds, it appears that a number have been constructed, and are in service in Europe. They are usually constructed with cylinders parallel and connected to a three-crank axle.

Several types of four-cylinder compounds have been built in the last ten or twelve years, but with the exception of the Vauclain compound they have been mostly built in Europe. Several four-cylinder tandem compounds have been built. From reports, we infer that those designed by Mr. John Player for the A. T. & S. F., are a success. One lately built for the N. P. is doing good work. In the Vauclain type two cylinders are placed on each side, one above the other. The distribution of steam is governed by one piston valve for each pair of cylinders. Both piston-rods are connected to the same cross-head. When the H. P. cylinder is above the rocker-shaft indirect valve motion is employed; when the L. P. cylinder is on top direct valve motion is used. The first of these engines was built in 1889. Since then, up to and including 1900, about 1,865 have been constructed. On special tests, a saving of from 20 to 45 per cent. has been made. The Vauclain or Baldwin compound is as much like a simple engine as it is possible to make it. There are, however, no notches in the quadrant to allow for a shorter cut-off than one-half stroke for the H. P. cylinder. Experiment has demonstrated that a shorter cut-off is not necessary. In practice it has been found desirable, when starting a heavy train, to be able to use steam direct from the boiler in the L. P. cylinders. To do this a suitable starting valve is provided which is operated from the cab.

In setting the valves, only the H. P. ports need to be considered. It is customary at the locomotive works, not to give the valve any lead for the H. P. cylinder at full stroke, but to set it line and line. The ports and bridges are so spaced as to give that portion of the valve, governing the admission of steam to the L. P. cylinder, about one-quarter of an inch lead. As a result of much experiment, it has been found that this arrangement gives the best average service.

Directions for operating are given, and some remarks on repairs conclude the paper.

Consolidation Mountain Pusher

American Engineer and Railroad Journal, Sep., 1901, p. 289.

A heavy mountain pushing locomotive was designed recently by the motive power department of the Atchison, Topeka & Santa Fe Railway, under the direction of Mr. John Player, Supererintendent of Machinery. Ten of these engines are being built at the Topeka shops and the design appears to be an excellent one for this service. These engines are intended chiefly for pusher service in the Sierras of Arizona and New Mexico. They are simple engines with piston valves, radial stayed boilers and swing motion pony trucks. With 21 by 32-in. cylinders, 57-in. driving wheels and 200 lbs. steam pressure the tractive effort will be 39,000 lbs., and while the heating surface is not large for an engine of this weight it is sufficient to permit of road as well as pushing service. More than usual care was necessary in selecting the proportions of these engines and the distribution of the weight was most carefully figured in order to meet the exacting conditions existing in the territory for which they are intended. Thus far they have come fully up to Mr. Player's expectations. A summary of the leading dimensions is given below:

Wheels: Driving, 57 in.; engine truck, 30 in.; tender, wheels, 33 in. Weights: Total of engine, 185,000 lbs.; on drivers, 166,400 lbs.; total engine and tender, 300,000 lbs. Grate area and tubes: grate area, 35 sq. ft.; tubes, 215, 2 in., 13 ft. 10 in. long. Firebox: Length, 120 in.; width, 40¼ in.; depth of front, 73¼ in.; back, 67¼ in. Boiler: Type, radial staying; diameter, 72 in. Heating surface: Tubes, 2,475 sq. ft.; firebox, 224 sq. ft.; total, 2,669 sq. ft. Wheel base: Driving, 15 ft. 4 in.; total of engine, 24 ft.; engine and tender, 52 ft. 10 in. Tender: Eight-wheel; water capacity, 6,000 gals.; coal capacity, 10 tons.

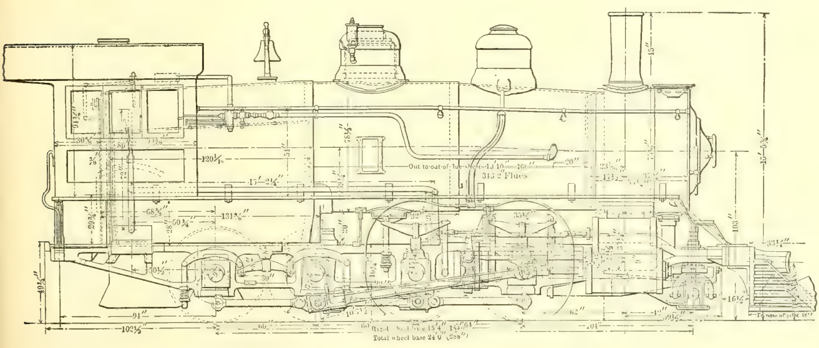
Some of the equipment features are as follows:

Brakes	American for drivers
Brakes	Westinghouse for tender, and train service
Pump	9½ ins.
Sight-feed lubricator	Double Nathan
Safety valves	Three 3½-in. Crosby
Injectors	Two No. 10 simplex
Metallic packing, piston rods	Jerome

Water Scoop Operated by Air

Railway and Locomotive Engineering, Sep., 1901, p. 408.

The new "Atlantics" from the Schenectady Works have the water scoop lowered and raised by an air cylinder operated from the main reservoir supply. Those put on some years ago had to be operated by a combination of levers and ropes and in case the scoop was not raised at the right time it would be raised by the end of the trough. This was pretty apt to disable the man at the lever. Some time ago one of the roads running into Chicago had two firemen laid up with broken arms, as a result of being hit with a water scoop lever. The latter arrangement of the air cylinder lowers the scoop; the air valve is then placed in the mid-positon, which connects both ends of the air cylinder to the exhaust, so the scoop is free to rise if it strikes any obstruction. Another movement of the air valve turns the air in to raise the scoop.



Consolidation Pushing Locomotive—Atchison, Topeka & Santa Fe Railway.

Cheap Oil, Cheap Transportation

Railway Age, August 16, 1901, p. 121.

The discovery of oil in Texas, in quantity far greater than the present demand, has caused an outcry for great reduction of railway transportation charges. The Texas railroad commission has ordered that the maximum rate on crude petroleum be reduced from 15 to 12 cents per 100 lbs. in common point territory. The commission has established the weight of a gallon of oil at 6.4 lbs. The railways claimed that the Beaumont oil weighs 7.4 lbs. per gallon. The rate, therefore, is actually reduced from 15 to about 10 1-2 cents. This makes oil a cheaper fuel than coal at many points, and deals a heavy blow at an established industry, as well as at railway revenue. A tank car contains 8,400 gals., weighing, by the railroad records, 62,160 lbs. The commission requires it to be billed at 53,760 lbs., thus in effect making the roads carry 8,400 lbs. of oil, free, also to commit the sin of underbilling. The railways endeavored to show that it costs more to handle oil tanks than ordinary freight, because, for one thing, the tanks have to be hauled back empty, but their protests were of no avail.

A. T. & S. F. Railway to Use Oil Fuel.

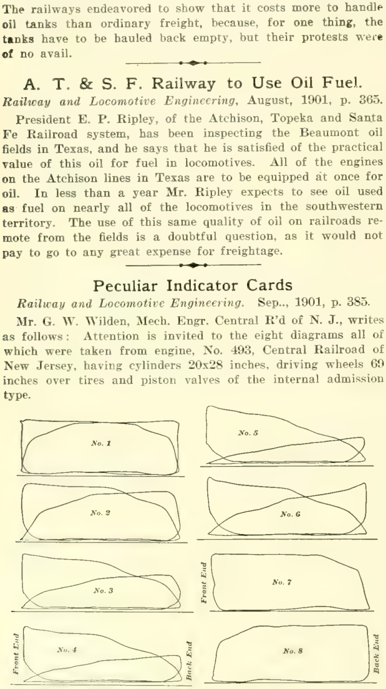
Railway and Locomotive Engineering, August, 1901, p. 365.

President E. P. Ripley, of the Atchison, Topeka and Santa Fe Railroad system, has been inspecting the Beaumont oil fields in Texas, and he says that he is satisfied of the practical value of this oil for fuel in locomotives. All of the engines on the Atchison lines in Texas are to be equipped at once for oil. In less than a year Mr. Ripley expects to see oil used as fuel on nearly all of the locomotives in the southwestern territory. The use of this same quality of oil on railroads remote from the fields is a doubtful question, as it would not pay to go to any great expense for freightage.

Peculiar Indicator Cards

Railway and Locomotive Engineering. Sep.., 1901, p. 385.

Mr. G. W. Wilden, Mech. Engr. Central R'd of N. J., writes as follows: Attention is invited to the eight diagrams all of which were taken from engine, No. 493, Central Railroad of New Jersey, having cylinders 20x28 inches, driving wheels 69 inches over tires and piston valves of the internal admission type.



Card No	Revolutions per Minute	Boiler Pressure	Cut Off Front End	Cut Off Back End	Lift of Throttle	M. E. P. Front End.	M. E. P. Back End	H. P. Front End.	H. P. Back End	Scale of Spring
1	48	175	[illegible]	19"	1/2"	134.7	132.0	143.6	140.74	120
2	54	185	14 [illegible]"	15 3/4"	1/2"	130.8	112.5	156.87	134.93	120
3	60	185	18 [illegible]"	19"	1/2"	111.6	72	149.95	95.96	120
4	96	185	11 [illegible]"	13 1/8"	1/2"	107.4	50.1	229.3	106.84	120
5	90	2[illegible]	11 [illegible]"	12 3/8"	1/2"	103.2	41.1	205.3	82.16	120
6	84	2[illegible]	12 [illegible]	13 3/4"	1/2"	108	87.9	201.5	164	120
7 & 8	54	[illegible]	2[illegible]	20 [illegible]"	1/2"	140	145.5	167.9	174.5	120

It will be seen from the diagrams that something occurred within the valve mechanism, causing six changes in the distribution of steam in the cylinder in the short space of time of seventeen minutes and forty-five seconds.

During the test trip from which these cards were secured something like twenty cards were taken previous to Card No. 1 here shown. All were normal and showed a reasonably good distribution of steam. When Card No. 2 was taken it indicated to the operator a dry valve; one minute and thirty seconds were allowed to pass and Card No. 3 was taken. This card gave evidence of an increase in the distortion at the back end with a slight reduction of the trouble at the front end.

Forty seconds were allowed to elapse when the next was taken. Card No. 4 shows that in the front end of the cylinder the distribution of steam is almost normal again, while in the back end the trouble is aggravated considerably beyond that in Card No. 3.

The back end card of No. 4 resembles more closely a well-throttled card than it does one due to weak, springy valve gear. After taking Card No. 4 the engineer was instructed to increase the lubrication on the indicator side of the engine. Three minutes and twenty-five seconds were allowed to pass before card No. 5 was taken, and it would not seem as though the increased lubrication had accomplished the desired effect. Four minutes more were allowed and Card No. 6 was taken. By this time the lubricant had begun to do its work. Two minutes and thirty seconds later by dropping the reverse lever a few notches we notice, after taking Cards No. 7 and No. 8, that everything is again in normal condition.

More than once during the tests made with this engine, which covered a period of three days, did this same difficulty arise. I will say, however, that on a previous test with this same engine 384 miles were covered and cards taken constantly, yet not a single one reveals the irregularity here shown. I would be pleased to furnish any of my readers who care to solve this problem with all details and facts they may request.

Box Cooling Water Forced by Steam

Railway and Locomotive Engineering, Sept., 1901, p. 390.

Mr. R. D. McBain, Master Mechanic, of the Michigan Central Railroad at St. Thomas, Ontario, has a device attached to the "cooling pipes" on some heavy engines, which is quite handy. Ordinarily the water pipes running to the crank-pins and driving boxes are connected to the water tank and depend on the head of water in the tank for force of flow. A small ejector, made of a 1/8-inch nipple screwed into a tee in the water supply pipe and handily placed on the boiler head does the business. Steam from the boiler through this 1/8-inch nipple lifts the water from the tank and forces it out through the pipes.

If one of the coolers is operated water goes right on the bearing at once. The very small amount of steam used to lift the water does not raise the temperature any perceptible amount.

Locomotive Draught Appliances

American Engineer and Railroad Journal, Oct., 1901, p. 303.

This is the first of the series of articles upon the tests of locomotive draft appliances which Prefessor Goss, of Purdue University, has been engaged to conduct for the *American Engineer and Railroad Journal.* Their purpose is to bring the information on this subject up to date and suppliment what has already been done in order to render it applicable to the very large locomotives of the present time.

Three series of experiments stand out as pre-eminently reliable and thorough. The experiments carried out by the Master Mechanics' Association committee of 1894 on Exhaust Nozzles and Steam Passages and those of the committee of 1896 on the same subject are in a class by themselves, having been carried out on an actual locomotive on a testing plant, while the Hanover (German) experiments of 1894, described in a paper by Inspector Troske and published in the *American Engineer* in January and the succeeding months of 1896, will always take their place as a most elaborate and careful investigation of the relation between stacks and nozzles.

The Master Mechanics' Association experiments of 1894, which were completed at about the same time as the Hanover tests, are valuable more from their influence and the suggestions they aroused than from an definite information which was obtained from them, although with the exception of the Hanover experiments, which had not at that time, we

believe, been published in America, they furnished the first reliable demonstration of the increased efficiency obtained from the lowering of the exhaust nozzle. Owing to the apparatus used not having sufficient capacity for variation, the full investigation of this feature could not be made, but enough was done to justify the more extensive experiments of 1896 and to serve as a confirmation of the results which had been obtained in this direction on many railroads.

Other variables experimented on in 1894 were the influence of the position of the choke in the exhaust pipe, the form and size of the stack, the angle of the exhaust jet and the most advantageous length of front end. The first three of these points were subsequently more elaborately investigated in 1896, and in view of this fact the 1894 results may be taken as being entirely superseded by the later experiments, but the remarkable influence of the length of the front end, which was the subject of only a few, not entirely conclusive, tests, to the best of our knowledge, has not yet been determined and so far as current practice is concerned, the experiments do not seem to be confirmed by experience in service to a sufficient extent to make the results convincing.

The 1896 tests, apart from the information obtained, are also valuable from their proof that a steady flow of steam from the nozzle gave results in every way similar to the actual discharge when the engine is running, thus confirming the assumption made in carrying out the Hanover tests. Definite results were arrived at, determining the relative efficiency of single and double nozzles, the best position of the choke in the exhaust pipe, the proper form of nozzle tip, the variation in vacuum with the position of the nozzle and several forms of stacks, and the relation between size of nozzle and vacuum.

The American Locomotive as a High-Speed Machine

Engineering Magazine, August, 1901, p. 690.

Mr. Egbert P. Watson contributes a paper on this subject. The average speed attained between our cities does not exceed forty miles per hour, except upon a few special trains. In many cases the average speed is less than forty miles per hour. The average speed on the railways of the United States is not higher to-day than it was twenty-five years ago, between the principal cities of the Union. Railway managers are not indifferent to this state of affairs, and have done what they could to cut down the time by straightening curves, reducing grades, using more powerful engines and laying heavier rails, but the gains in time are slight in comparison with the public demand. The earning capacity of a railway depends, other things being equal, upon the hauling power of its locomotives under the most favorable conditions; that is, upon the cost per train mile. Great loss in time and power results in endeavoring to overcome natural obstacles by mechanical expedients, as in the case of a trunk line railway following a tortuous waterway for long distances.

The points of the argument as to the further development of the American locomotive as a high-speed and high-power machine are: That a radically new locomotive is not available for immediate service; that railway officials will give promising devices fair trials; that the field for radical improvement is exceedingly limited. Step by step the present engine has been raised from 500 hp. to 1,500 hp., not by startling novelties of any kind. The chief improvement has been in the matter of increased boiler pressure. The cylindrical corrugated firebox introduced by Mr. Cornelius Vanderbilt has in it the promise of great possibilities in the direction of still higher pressures.

The greatest stumbling block is the line itself. There is no object in building high-power locomotives to drag trains by brute force up steep hills and around short curves and upon more or less heavy gradients. The committee report to the M. M. Association showed that a modern high-speed locomotive costs in operation from 25 to 50 per cent. more than for ordinary speed.

The Cleveland Engines

Railway and Locomotive Engineering, August, 1901, p. 341.

The American Locomotive Company is building at its shops in Scranton, Pa., twelve simple engines for the Intercolonial Railway, of Canada, five passenger and seven consolidation freight engines, with the Cleveland cylinder and steam chests.

The consolidation engines have a cylinder 65 1-4 inches long over all between the cylinder head joints, 21-inch bore and 28-inch stroke. There are two exhaust openings 26 inches from the steam end of the cylinder, 7-8 inch wide, 6 1-2 inches apart, that extend clear around the cylinder and are connected direct to the exhaust tip. This exhaust tip has an annular opening outside the central one, one for this exhaust passage and one for the exhaust passage away from the piston valve.

There are two pistons 5 inches thick with snap rings 1 1-4 inches wide so they will travel over the 7-8 inch exhaust opening without catching. The pistons are on the same rod, 23 inches apart. These pistons alternately travel over the exhaust passage at the end of the stroke, so that the steam, which has followed the piston, can flash out through this annular exhaust in short order, as the piston travels 2 inches beyond this exhaust opening, the entire volume of steam has a chance to expand down before the piston starts on its return stroke and covers this annular exhaust. The piston valve also operates an exhaust passage the same as in any simple engine, closing at the right time to give the proper compression. This valve admits live steam at its inside edges, which are about 44 inches apart.

There is nothing new in this type of cylinder, as it was used as long ago as 1875 on the Lake Shore and Michigan Southern Railway and Ohio Central Railroad. It was then called the Robert's engine. At that time it failed on account of the weakness of many of the details of construction, which the present designers claim to have overcome. They show their faith in them by building twelve at one time.

German Locomotives at the Paris Exposition

Revue Generale des Chemins de fer, May, 1901, p. 474.

There is an engine of the Bavarian State Railways that would be known under the Whyte system of nomenclature as a 2-4-4, and is intended for service on the main line. The driving axle, which is the one at the rear, is given no end play. But the forward driving axle and that of the pony truck in front are so connected together as to permit of a transverse movement of each. In order to accomplish this the truck axle is attached to the forward driving axle by means of a triangular frame, whose base is fastened to the truck and the apex to the driving axle. The center of the frame is connected to the locomotive by a pivot. When on a curve, this front frame turns about its pivotal point, and the two axles are given a lateral displacement in opposite directions. The rear bogie has a lateral displacement regulated by springs.

The fire-box is of copper strengthened at the top by staybolts, of which the two upper rows are free to expand.

Water is carried in side tanks, and the fuel in two boxes at the rear of the foot plate. These boxes are divided into two compartments, the larger containing coal and the smaller briquettes. There is a large cab that is completely inclosed. The engine weighs in working order 68.8 gross tons, of which 30 are upon the driving wheels.

Another engine is that of the Prussian State Railway, and intended for use on the Metropolitan system. Its great tractive power, coupled with its adhesive weight (31.4 gross tons), gives it a very efficient starting power. It stands on eight wheels, of which four are coupled after the fashion of the Columbia, or 2-4-2 type. The front and rear axles are radial, with a play of about 1 3-4 inches in each direction. The arrangement is similar to that used by Mr. Webb on the London and North-Western Railway. The axles are brought back to their normal position by helical springs.

Disincrustation of Boilers

Iron and Steel, October 5, 1901, p. 21.

The following article recently appearing in *Revista Minera Metalurgica y de Ingeneria*, of Madrid, the leading journal of its kind in Spain:

The use of zinc to prevent the oxidation of the iron and the incrustation in steam boilers has greatly increased during recent years. Heretofore, zinc has been employed for this purpose only in the shape of raw pigs, but after many experiments made by the society of "Mines et Fondris d Zinze d la Vieille Montagne," which have since been confirmed by the British Admiralty, by the national French marine, and many great marine companies, it has been established that compressed laminated zinc made in the form of thick plates for application as an inside boiler lining is greatly superior to the old method. In fact, the galvanic current developed transforms the pig of raw zinc into a more porous substance, in which the metallic molecules are isolated one from the other by the corrosion which is quickly produced, resulting in this, that the intimate metallic contact, which causes the generation of the electric current, is eliminated. Compressed laminated zinc, on the contrary, resists the spongy internal corrosion, as it corrodes only on the surface, thus being very slowly consumed and being capable of conducting the current as long as a metallic nucleus remains. The application of the laminated plates is very simple. They are applied to the walls of the boilers by means of strips and are so distributed that the galvanic action is exercised in an even way, when possible, over the entire surface of the iron. When oxidation is produced in any part of the boiler, it is because the nearest zinc plate is too far away. By this employment of pressed zinc the incrustation of the boilers is avoided, and at a small cost.

[In the discussion on "Setting boiler tubes," at the last M. M. convention, Mr. Cross, of the Canadian Pacific Ry., spoke of having found that zinc in boilers was the means of preventing pitting—See *Digest* for July, 1901, p. 253.—Eds. Railroad Digest.]

American Locomotives in Europe

Consular Reports, Sep. 6, 1901, p. 1.

Mr. Dean B. Mason, United States Vice and Deputy Consul-General at Berlin writes that up to the present, the American locomotive, which has been largely and successfully used in Russia, can hardly be said to have made more than an appearance in Germany.

The Bavarian state railway authorities have during the past two years used a small number of American locomotives for experimental purposes, and the Prussian Government is also operating a couple of our engines. The results obtained in Bavaria have been highly satisfactory, and have dissipated the belief in official circles that American engines were not adapted for use on German railroads. It is therefore considered extremely probable that the American-type engine will be built by the German locomotive builders within a short time. The Prussian railroad authorities are at present experimenting with the so-called superheated steam engines made by Schmidt, in Cassel. Should these tests not prove satisfactory, it is thought likely that the American-type of locomotive will be adopted in Prussia. Both cars and trains are uniformly much smaller and lighter in this country than in the United States, with the result that freight rates are very much higher. The 10-ton freight car is still all but universal in Germany. Since 1893, no important fact of American railway development has escaped the attention of German railway managers. The vestibule express train and the sleeping and dining car have been copied almost literally. More recently, the enormous freight trains of 40-ton cars, drawn by powerful locomotives worked up to their full capacity, have taught the German engineers the secret of cheap freight traffic. The unfavorable report of the Midland Railway of England, has been explained by an American engineer to have been largely due to the fact that the heavy, powerful American engines were used to perform the same kind and quantity of work as the smaller English ones.. According to the superintendent of the railroad, "the American locomotive which have been employed since the middle of 1899 are £500 cheaper in first cost, and are satisfactory as to power, but consume from 20 to 25 per cent. more coal than those of English make. As good engines can be built in America as in England, but owing to the different methods of railroading in the two countries, the British locomotives are better adapted for use in England."

The German State railways buy their fuel from the coal and coke syndicates, and pay what would be considered in America exorbitant prices. Economy in fuel consumption is therefore, and must remain, a point of prime importance, and no type of locomotive will be adopted by the Bavarian or Prussian railway administrations which does not conform closely to the German standard of efficiency in this respect. The American engines which have been thus far ordered and used in this country have been bought for purposes of study and experiment, and however efficient they may prove to be, it is not to be expected that the German state governments will place any large contract for locomotives or railway material with other than German manufacturers. Of the 18,291 locomotives in service in Germany in 1899, 17,491 belonged to the State railroads and 800 to private railway corporations.

During the year 1899, 446 engines were purchased by the State railways and 56 by private companies. These figures show the limited nature of the opportunity in Germany which is open to American competition. There are in Germany five or six leading locomotive builders. They are careful and conscientious, but slow, and one of the chief advantages which an American competitor would have, is in the rapidity with which delivery could be made. The American system of building locomotives of certain uniform types, with interchangeable parts, is recognized as an advantage, and this, added to their lower cost and earlier delivery, constitute their chief merits for the European trade.

In order to sell American locomotives in Europe, it would seem desirable that our leading American locomotive builders should establish an agency at some central location, such as Berlin or Paris, where close track could be kept of the needs of the European market and whence representatives could be sent to confer with representatives of foreign railroads. The importance of having representatives versed in foreign languages and of sufficient technical knowledge to answer all possible questions, is acknowledged. In order to make the most of this opportunity, all possible facilities should be given to the foreign buyer to judge of the American locomotive without the necessity of sending or going to the United States.

Screwed Stud Stays in Locomotive Fireboxes

Mechanical Engineer (London), July 13, 1901, p. 35.

In this article the editor, Mr. W. D. Fowler, comments upon some tests made by M. du Bousquet, chief engineer of material and traction of the Chemin de fer du Nord, France. The stays first experimented upon were copper, and were threaded throughout their entire length. Copper stays were also tried only screwed at their ends and turned down in the middle. Observations of the working of stays of this latter form do not appear to have presented any noticeable improvement. Carefully tabulated records showed that the three upper rows of stay bolts in the side plates and back plate of the firebox were those which most frequently failed, and that next after these were the stays near the angles and under the firebrick arch. After trial of stays with swelled ends, the question of increasing the diameter of the stays which seemed to suffer most from fatigue was considered, but, as the ruptures of these stays are due to the bending action arising from the unequal expansion of fire-box and casing, this remedy did not prove efficacious. Subsequently metals other than copper were tried, particularly iron and soft steel. In some tests the iron stays which were fitted with round ends where they were screwed into the sheets of the firebox and the firebox casing, were made of rectangular section in the part crossing the water space, the section having

a greater width than depth, so as to allow for the bending action. The results with stays of this form did not meet expectations, and the trials were not extended. Tests of soft steel stays were also quickly given up, as the numbers of fractures did not diminish, and with the use of this material a new difficulty appeared, the holes in the fire-box plates deforming to a greater extent and more rapidly than with copper stays. Trials with nickel steel stays also gave no better results. In summing up his experience with these manganese bronze stay bolts, after four years' working M. du Bousquet states that "during this time 3,500 have been put in service, most of them in those parts of the firebox which experience has shown to be subject to the most frequent breakage, and up to Dec. 10, last year, not one of the manganese bronze stay bolts had been found broken."

There is one point, however, in connection with screw stud stays which the French experiments do not touch upon, but which was strongly emphasized in connection with the failure of the Great Eastern engine as well as the explosion on the L. & Y. engine at Knottingly, and that is the desirability of screwed stud stays, no matter of what material they are made, being provided with substantial heads in order that full advantage may be taken of the tensile strength of the stay.

[For Great Eastern Railway boiler explosion at Westerfield see the *Digest* for March, 1901, p. 101, and for the Lancashire and Yorkshire accident at Knottingly see the *Digest* for May, 1901, p. 183.—Eds. Railroad Digest.]

Austrian Locomotives at the Paris Exposition

Revue Generale des Chemins de fer, July, 1901, page 50.

There were six locomotives exhibited at the Paris Exposition in the Austrian section at Vincennes.

(1.) A compound express locomotive for heavy grades, of the 10-wheel, or 4-6-0 class. The work developed at the tire of the driving wheels of these engines has been upwards of 1,000 hp. On some trial runs a train of 207 gross tons was hauled at a speed of 40 miles an hour over a 1 per cent. grade, which corresponds to about 1,300 hp.

Among the peculiar features of this engine is the fact that the connected domes, which are usually put on the boilers of Austrian State Railway locomotives are here replaced by a cylindrical reservoir, in communication with the interior of the shell, by means of two necks. This reservoir has a diameter of 19½ in. and contains the throttle valve.

The engine is a two-cylinder compound with the cylinders between the frames. The valve seats are vertical. The high-pressure valve is of the ordinary type, but the low-pressure is fitted with a Trick port. The Walschaert valve motion is used and so connected between the two sides that there is a difference of 15 per cent. between the points of cut-off in the two cylinders.

At starting, full steam pressure can be admitted to both cylinders through .9 of the stroke, the Gölsdorf starting valve being used.

The frames are outside the wheels and the engine rests upon a spherical center plate on the track. Its transverse oscillations are limited by elastic resistances. Contrary to the usual Austrian practice, the truck is allowed to have a lateral displacement that is controlled by helical springs, and inclined hangers. The coupled axles are also allowed a lateral displacement so that the engine may round curves with ease.

(2.) A compound locomotive of the 2-6-2 type for service on the Metropolitan Railway of Vienna. This engine is a two-cylinder compound with outside cylinders and inside frames. Water is carried in side tanks, set on the running board. There are two domes on the boiler after the fashion of the Austrian standard and they are connected by an outside pipe.

(3.) An express passenger locomotive of the Atlantic or 4-4-2 type. It is used on the line from Vienna to Cracovia, hauling trains of from 150 to 180 gross tons at an average speed of about 50 miles an hour. In service it has surmounted a grade of .26 per cent. and 5 miles long at a speed of 50 miles an hour, with a train weighing 203 tons. At the time the cut-off ranged from 18 to 23 per cent. of the stroke and the indicated horsepower was 1,027. The locomotive burns fuel of an inferior quality containing from 10 to 25 per cent. of ash; this necessitated a large grate of about 31 square feet area. As the weight per axle was not allowed to be more than 14 gross tons the trailing wheel was put under the rear end of the firebox.

(4.) Compound consolidation (2-8-0) for heavy grades. The firebox of this engine is large and is intended to burn a low-grade coal. While passing through the Arlberg tunnel, a distance of about 6½ miles, a heavy petroleum fuel oil is burned with the Holden apparatus. The fire door of this engine, as well as that of the one for the Vienna Metropolitan (2) is fitted with a Marek smoke preventer. This consists of a valve or damper which opens automatically, each time the door is opened for firing, and which must be closed when the smoke ceases to show at the stack.

(5.) An eight-wheel (4-4-0) compound express locomotive. The cylinders are 19½ in. for the high pressure and 30 in. in diameter for the low pressures. The weight is 55.7 gross tons, of which 28.7 tons are on the driving wheels. The machine is designed to haul trains of from 230 to 290 tons over 1 per cent. grades, which it is said can be done at a speed of 25 miles an hour.

In order to facilitate starting, a pipe led directly into the receiver makes it possible to introduce live steam at a reduced pressure for periods of late cut-off. The opening of this pipe which leads to the steam chest of the low-pressure cylinder is uncovered by the low-pressure valve at the end of the stroke. This (the Gölsdorf) arrangement possesses the disadvantage of causing considerable back pressure to exist in the high-pressure cylinder, whose exhaust does not escape into the atmosphere while the apparatus is in operation.

At the front end the locomotive rests upon two hemispherical sockets set on either side of the king bolt, and which, in turn, are carried by and can slide upon flat surfaces. The truck itself is given no side motion. The axles are of nickle steel.

(6) Forney (0-6-2) type of narrow gauge locomotive. It is a tank locomotive with outside cylinders. The locomotive rests upon the rear or truck axle through a transverse spring whose band is against a central plate, which takes the load of the rear frame. The latter extends from the carrying axle to the rear driver and forms a truck of a somewhat novel description. The frame of this truck is triangular. The two ends of the base are rigidly fastened to the oil boxes of the rear axle, and the apex is pivoted to the center of a cross brace connecting the oil boxes of the rear driving axle together. This frame is thus moveable about a vertical axis fastened to the main frame of the engine. On account of this connection between the two rear axles, every transverse displacement of the trailing axle is accompanied by an equal one in the opposite direction of the rear driving axle. The Krauss bogie thus accomplishes the same object as the Bissel truck, but it is claimed that it gives the engine a surer and easier guidance. The displacement of the coupled axles, relatively to each other, is facilitated by the use of spherical crankpins at the ends of the side rods.

The spring suspension of the three front pairs of wheels is effected by means of semi-elliptic springs connected together by longitudinal and transverse equalizers.

Transportation at the Pan-American

Railway Age, August 2, 1901, p. 2.

The usefulness of the exhibition at Buffalo as an advertising medium has been realized most effectively by the Delaware, Lackawanna and Western, the New York Central and Hudson River, the Grand Trunk, the Canadian Pacific, the Southern, the Atchison, Topeka and Santa Fe, the St. Louis and San Francisco and the Southern Pacific Railways.

The Lackawanna has a train made up of a locomotive, a vestibuled passenger car, a 60,000-pound box car and an 80,000-pound coal car. The coach contains transparencies illustrating scenery along the road.

The New York Central has some of its latest freight and passenger locomotives ranged beside and behind the famous De Witt Clinton train of 1831, composed of the dwarf engine, tender and three omnibuses.

The Delaware and Hudson has a 60-foot postal car, in which all the latest appliances are in practical operation.

Large collections of pictures of scenery constitute the chief attraction of the exhibits of the Grand Trunk and the Canadian Pacific. Five large wall paintings of Rocky Mountain scenes invite tourists to take the Canadian Pacific route

across the continent. A fine model of the company's "Empress" steamships, which ply on the Pacific Ocean, is also exhibited. Several alcoves are filled with illustrations of Grand Trunk scenery. A number of staffed and mounted brook trout of great size are shown, and there is the stuffed skin of a 57-pound "muscallouge." These neighboring Canadian lines have much in common, as well as in opposition, and the two together afford a satisfactory picture of the scenery and many of the products of the Dominion.

A diorama of the grand canyon of the Colorado advertises the Santa Fe.

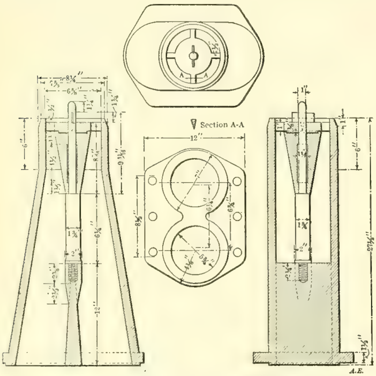
The St. Louis and San Francisco have attendants distributing literature freely. A large map adds point to the moral of the printed matter.

The Southern leaves no stone unturned to point out the advantages to the country below the Potomac and Ohio. The wall space is occupied by pictures, flanked by sheaves of grain.

New Exhaust Pipe

American Engineer and Railroad Journal, Sep., 1901, p. 283.

Mr. J. B. Barnes, Superintendent Motive Power of the Wabash Railroad, has designed a new locomotive exhaust pipe and an arrangement of front end appliances, of the performance of which he speaks very highly. His record shows a substantial reduction in back pressure, a good effect on the fire and an important saving in coal. He reports a saving of one ton of coal in runs of 100 miles over former practice, as a rough comparative figure. Twelve of his engines have been fitted with these pipes, including several different types in different classes of service, and they appear to be doing equally well in all.



New Exhaust Pipe—Wabash Railroad.
By J. B. Barnes, Superintendent of Motive Power.

The exhaust pipe has a bridge 12 ins. high, in the center of which a long spindle is screwed. On the top of the spindle an inverted cone is placed. It rests on a shoulder on the spindle and on its top face a spider is placed, with wings, tapered in section, reaching to the sides of the nozzle. The whole is secured by a key driven through a slot in the top of the spindle. To vary the size of the opening different cones and spiders are used, the nozzle diameter remaining unchanged.

The object of this arrangement is to pass the steam out of the nozzle through an annular opening without diminishing the size of the opening. It provides means for issuing the steam in a hollow stream of large diameter, causing less back pressure, and it appears to increase the entraining action of the jet. As shown by indicator cards, the back pressure is less than with the ordinary nozzle and the draft effect seems to be very satisfactory, as there is no trouble in keeping fires and front ends free and clean. This exhaust pipe has been patented by Mr. Barnes.

Usefulness of Retaining Rings

Railway and Locomotive Engineering, August, 1901, p. 353.

The retaining rings, used to hold steel tires on the wheel centers in case the tires break, do not get as much credit for preventing derailments or break-downs as they should. If these rings are properly put on, a broken tire will run a long distance without coming off the wheel center or causing a disaster.

On one occasion, some years ago, the writer saw, on a wrought-iron wheel center of a coach wheel, a steel tire broken in seven places and all the pieces held in place by the Mansel retaining rings, so that the wheel stayed on the rail and was not noticed till it was found by an inspector, and this was in very severe cold weather in Canada.

Only a few days ago a tire broke on a fast passenger engine, and the engine came in with the train without any delay, a distance of nearly 60 miles.

Steel tired coach wheels with the tires locked on the wheel centers in a variety of ways are being made by a great many wheel makers. If they are an advantage and a safety device for a car wheel, they certainly will be for a driving wheel of a locomotive.

[We remember seeing a tire on a wheel under the tender of a passenger engine so loose that it could be turned round on the wheel center, held in place by the retaining rings, enabling the engine to complete its trip without mishap, the brake being cut out on the tender.—Eds. Railroad Digest.]

Rack-Rail Locomotive

Revue Generale des Chemins de fer, May, 1901, p. 479.

This rack-rail locomotive belongs to the Wurtemburg State Railway, and is intended for the same service as those that have been at work on its lines since 1894. These rack roads have 10 per cent. grades 6,900 feet long, from Reudlinger to Munsingen.

It is carried on eight wheels whose axles are of the Klose type, the three rear pairs being coupled and the front set in a radial truck forming a 2-6-0 or mogul engine.

The machinery is duplicated, one set driving the coupled wheels and the other, which is inside the frames, driving the gears for engagement in the rack. The two sets of engines are entirely independent of each other. The interior engines drive a crank axle that is placed between the two front driving axles and carries, at its centre, a pinion having 15 teeth. The latter meshes in with two other gears having 34 teeth each, that are loose upon the two coupled axles, and which mesh with the rack of the Riggenbach system.

On account of the independence of the two sets of mechanism, the engine can be worked by adhesion alone when running over a level or up a moderate grade; while, over the rack sections, the two sets can be worked independently of each other.

A characteristic feature of this machine is that, despite the independence of the two sets of engines, they can be made to work together as a compound. To accomplish this the connections are so arranged that steam is taken from the boiler direct to the outside cylinders, which then become the high pressure element of the compound. The steam then passes to the inside cylinders, which act as low pressure. This method of action is rendered possible by the greater speed of the inside cylinders, which is such that the space swept through by their pistons is twice that of the outside.

A Centrifugal Speed Indicator

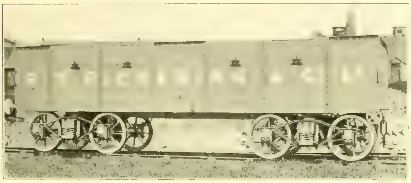
There is in use on the State Railway of France a speed indicator by which the oscillations of a pendulum are made to register the speed of the train. The principle upon which it works is that the ball of the pendulum is held in position by a spring, and this spring is extended more and more by the centrifugal action of the weight, as the oscillations become more rapid. The pencil describes a line on a moving strip of paper, and is held steady by a piston moving in an oil cylinder.—*Revue Generale des Chemins de fer* (Paris).

Car Equipment, Appliances and Related Matters

Railway and Tramway Rolling Stock

Glasgow Herald, Aug. 9, 1901.

As iron and steel have almost entirely displaced wood in shipbuilding, they are certainly likely to do the same in wagon building, and the 25-ton bogie wagon built by Messrs. R. Y. Pickering & Co. (Limited), Wishaw, distinctly shows the direction in which the trade is moving. The question of adopting in this country wagons of much larger capacity than those hitherto in use, and thereby reducing the ratio of dead weight to paying weight has been much to the front of late. It is true that the Caledonian Railway Company some time ago built a wagon with the view of carrying 50 tons of iron ore, but we believe that the wagon constructed by Messrs. Pickering, shown in the Exhibition, is the first complete attempt that has been made to build, for use in Scotland, a wagon on American lines (that is, a large wagon running on bogies) carrying out the object above-mentioned. The wagon shown is designed to carry 25 tons of coal with a tare of 10 1-2 tons. Hitherto in this country wagons have been restricted to 10 tons capacity, the tare averaging about 6 1-2 tons.



As the present arrangements for shipping in Scotland practically prohibit the use of anything larger than the standard 10-ton wagon, this wagon has been constructed specially for coal depot traffic, and as there are no arrangements at the Scotch coal depots for discharging wagons except by hand, the doors of this wagon are made to suit this method of emptying, but we understand that provision has been made in the design so that bottom doors can be easily affixed as soon as the depot sidings admit of such being used. The whole of the wagon is built of steel and iron, and the materials are almost entirely of local manufacture. The wheel centers are of solid wrought-iron made under Messrs. Pickering's powerful hydraulic press at their Wishaw Works. The wagon and wheels are beautifully finished, and reflect the highest credit on the builders.

Steel Flat Car—Chicago and Alton

Railroad Gazette, Oct. 25, 1901, p. 735.

The Chicago & Alton R'd has recently built at its Bloomington shops some 100,000 lbs. capacity flat cars. The under frame consists of commercial rolled shapes, reinforced by truss rods. Material for repairs of these cars can therefore be readily obtained. The length of the car is 42 ft., width 9 ft. The floor at center of car is 4 ft., 1 1-2 in. above the rails. The weight is 33,900 lbs. light, and under a test load of 112,251 lbs. of old cast-iron wheels the car deflected about 1 in. below the horizontal line, but regained its original camber after the load was removed.

The side, intermediate and end sills are 8 in., 21 1-4 lbs. channels, and the center sills are 8 in., 23 lb. I-beams. There are six 1 3-8 in. truss rods with the ends upset to 1 3-4 in. The longitudinal sills are securely connected to the end sills and body bolsters through plates, and suitable malleable iron fittings. The end construction of the car is particularly strong. All special shaped details are either of pressed steel, cast steel or malleable iron, no cast-iron being used in the construction of the car.

The flooring is 2 3-8 yellow pine ship-lap and is secured to nailing strips placed alongside the longitudinal sills where accessible, and bolted directly to those sills. The draw gear makes use of four springs, two in front and two behind. The forward pair takes all the pulling forces, and the rear pair only assists in buffing. The rear pair act chiefly as a yielding cushion which does not come into play until the front springs have done their work. The trucks are of the pressed steel arch bar type. National Hollow brake beams and Janney couplers of an extra heavy type are used.

Painting Steel Cars

Railway and Locomotive Engineering, Sept., 1901, p. 418.

It is often many years before iron or steel framework shows signs of deterioration from rust or age, but once the process of decay sets in, unless it is promptly arrested, it spreads with lightning rapidity.

A case in point is that of some steel cars which were bought by a prominent concern about eight years ago for gravel service in contract work. They passed into the hands of a railroad company later on and were used in coal, gravel and cinder service. Two years ago the cars looked well, showing but few signs of the rapid deterioration which subsequently developed. A recent examination of the cars showed that they had so decayed as almost to necessitate rebuilding. For instance, the I-beams had rusted away on each side so that there were holes clear through the upright part, while the tap of a hammer on the bottom or sides of the cars would put more holes in them. Iron framing if exposed to the drip from coal and cinders looks all right for a few years, but when the process of oxidation once gets the original scale removed, it will eat away the strength of the beams in a few months.

The Standard Paint Company have for years been manufacturing the well-known P & B preservative paints, which are offered as the best protective known for metal, wood, brick, stone, etc. The big railroad companies have for years not only used it on the iron framework of the cars, but on the wood floors of refrigerator, dairy and stock cars, etc., where it is peculiarly valuable for waterproofing purposes.

Steel Passenger Cars

Railway Age, Sept. 13, 1901, p. 232.

Railroad men are almost prepared to endorse the steel freight car; the steel truck is an assured thing. Steel underframing for the box car is being introduced with the expectation that it will be satisfactory. In passenger equipment we find the same condition of affairs as existed in freight equipment 10 years ago. Abroad steel underframing has been the order of the day for a long time. Steel and iron had been so universally recognized as the only material suitable for running gear of cars, that when the bogie was offered it never entered in the head of the European engineer that wood could be used. If the metal sill was a good thing for short construction, and it was, it should be doubly good for long construction. It was so used abroad and was not found wanting.

In this country we are, in passenger car construction, doing what we did in that of freight car construction. We built of wood and resorted to every trick of the trade that the carpenter could devise to strengthen the structure. We have resorted to all sorts of expedients to stiffen the body in its span between bolsters, and a more heterogeneous collection of trussing and bracing it would be difficult to find, than that shown by drawings of car framings, put out during the past 10 or 15 years. Some builders now pin their faith to the steel plate girder, commonly called the Challender truss. There is no reason why this form of side framing should not have been introduced 30 years before it was, except for an historic conservatism and settled conviction that passenger cars should be made of wood. We are using a deep plate girder to carry the load which is duly credited to the sills, or which the sills, as trussed, are supposed to carry. The query suggests itself, would it not be equally cheap and more satisfactory to do away with this arrangement at once and put in an all-metal construction?

The same process of evolution is going on in the roof. With the plain arched roof a stiff wooden carline served. With the clear story the same construction was used until the cross pieces

spanning the car were condemned and the carline was carried up over the top of the monitor roof. Our European friends took the plunge at the start and built a metal underframing and a metal truck. We may criticize the elaborateness of design, and question the wisdom of incurring the expense involved, but the fact remains that they have a working metallic truck under passenger cars and we have not.

Do we cling to wood with the idea that it is less noisy than steel? There is probably nothing in this idea. Noise may be a good reason as a talking point in an argument against the steel truck, but it is a worthless one from an engineering, commercial or sanitary standpoint.

Cast-Iron and Steel Tired Wheels

Railway Age, Aug. 30, 1901, p. 183.

Mr. Chas. V. Slocum, president of the Keystone Car Wheel Company of Pittsburg, writes to the *Age*. He mentions an editorial in that periodical of July 12, and says, cast-iron car wheels almost without exception are made upon specifications as to outlines, internal construction, etc., as laid down by railroad companies. Among other things a weight is specified, and this weight invariably is 100 to 500 lbs. lighter than any steel-tired wheel permitted in regular railroad service. No one has as yet advanced a satisfactory reason why the great difference in weight between the cast-iron wheel and its steel-tired competitor should be permitted in regular service. He says that railroad men have assured him that a steel-tired wheel weighing 600 lbs. would not be considered safe even in freight service, yet by far the greater proportion of cast-iron wheels in service do not weigh over 600 lbs. For 33-in. wheels, the steel tires alone weigh 600 to 900 lbs., unfinished, without hub and plate. The heaviest cast-iron wheels ready for service are not over 650 lbs. The cost of each type of wheel is for steel wheel, so-called, $35 to $65 per wheel, all told; that for cast-iron at 1½ cents per pound finished, or less than $10 per wheel. The writer predicts that before railroads will pay this difference of 300 to 600 per cent. for wheels for heavy freight service, manufacturers will be given an opportunity to supply heavier wheels than now permitted, and at better prices.

It is an almost unheard of thing for a railroad official to say to the manufacturer: "Build for us a wheel according to the best modern ideas and according to the best results of your practice, and your experience, and which will give the best results in heavy freight service, or under the 100,000 lb. capacity car." Far from it. The specifications almost without exception demand a wheel made rigidly to certain well defined lines, which have not varied materially in years. The manufacturer deviates or ventures an improvement only at the risk of rejection. Tests and inspection are made more severe every year, with the intention of securing better wheels, and the desired result is obtained only in a degree. What manufacturer would not be willing to make and guarantee wheels for heaviest service, if paid 2 cents per pound? Compare this with, say, 5 cents per pound for a steel substitute.

Special Quality of Cast-Iron Wheels

Railway and Engineering Review, Sept. 7, 1901, p. 590.

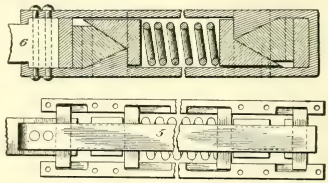
The failure of cast-iron under heavy capacity cars has been the subject of apprehension, and has given rise to the suggestion that this type of wheel had about reached its limit. It is interesting to note, however, the universal confidence in chilled wheels, which was expressed at the convention at Saratoga. Most makers of chilled cast-iron wheels claim to be able to make better wheels than those now going into service. The competitive price limit has practically prevented progress in quality. A half-tone illustration of a wheel made by the New York Car Wheel Works at Buffalo is given. The wheel is marked "50-Ton Special," and is one of a lot made for the Pennsylvania R'd. The wheel stood 806 blows of the M. C. B. drop test without a crack of any kind appearing. It is evidently a triumph of the wheel-maker's art. If wheels of this grade can be supplied at a cost, say, not to exceed 50 per cent. over ordinary grades of wheels, railway companies need not have to face the question of steel-tired wheels for any capacity freight cars.

About ten years ago the wheel-makers referred to above undertook a series of experiments looking to increasing the strength of chilled wheels. They purchased the best materials obtainable, and offered a bonus for every increase of 300 lbs. in the breaking strain of one inch test bar, 12 ins. between supports. This led to the discovery that a charcoal iron made in Lower Canada from bog ores, seemed to have the same qualities as the well-known Swedish irons, and that gave not only an increase in strength but in the wearing qualities of the wheels made from mixtures to which it had been added. The test bar made from standard car wheel mixtures would break at from 2,600 lbs. to 2,800 lbs. The transverse strength test of similar bars of this bog ore iron went regularly as high as 3,500 lbs., and it has gone as high as 4,200 lbs. This increase of strength was not alone obtained in the laboratory; tests were made of wheels furnished to railways. A table of tests made on 63 wheels supplied to the P. B. & L. E. R'd showed an average of 102 blows to break, the M. C. B. test prescribes eight blows successfully withstood before acceptance. In the tests it was noticed that the fracture of these wheels was very different from the fracture of the standard cast-iron wheel, in that the metal seems to have a clinging or fibrous character, which made the rupture very gradual, the wheel frequently standing more blows after it was once cracked, to break it into one or more pieces than it did in the first instance to crack the wheel.

Standard Friction Draw Gear

Railway and Engineering Review, Sept. 21, 1901, p. 625.

The Standard Coupler Co. of New York has a new form of friction draw grear, invented by Mr. R. D. Gallager, Jr. The draw bar has the ordinary V-shaped strap, which is provided with two shoulders with beveled face, as shown in the illustration. Between these two shoulders there is mounted a pair of followers, which have their opposite side portions made to slide in guide-ways in the cheek-plates, and also provided with inclined faces which are oppositely disposed with respect to the beveled projections on the V-shaped strap. Between the followers is placed a helical spring which bears upon each of them. Latterly moveable wedge-blocks are fitted in the spaces formed by the inclined faces of shoulders and followers, and each of these wedges has at its outer end, a separate abutment block that has its opposite sides mounted to slide in guide-ways on the cheek-plate.



When outward strain is put upon the draw-bar, the V-shaped strap is moved forward, the front inclined shoulder travels across the laterally moveable wedge block and thereby moves it. This lateral movement of the wedge forces the adjacent follower in a rearward direction, thus tension is applied in opposite directions to the spring. The rear shoulder and wedge block act in a similar manner when rearward strain is applied to the drawbar.

Cooling and Ventilating Passenger Cars

Railway and Locomotive Engineering, Oct., 1901, p. 439.

Attention is called to a system of air fans for cooling and ventilating passenger cars on railroads, perfected by the Safety Car Heating & Lighting Company. A train on the New York Central has just been equipped with these fans and is now in service, while on a Pullman car running on the Erie Railroad from Jersey City to Tuxedo there have been two in operation for some time.

The plan followed is both feasible and economical, as two fans are placed in each car diagonally opposite and are made to revolve by means of compressed air furnished by an additional air pump on the locomotive, the air thus supplied being conveyed the entire length of the train by means of the steam pipe which heretofore has served no purpose during the summer months. On each car is placed a storage tank, into which the

air is first carried, and from there it is taken to the fans by means of a very small pipe. The fans weigh only about 6 pounds each, and when this is compared with an electric fan weighing between 25 and 30 pounds, one of the advantages possessed by the air fans becomes at once apparent.

Another superior feature is found in the fact that these fans not only stir up the air in the car, but introduce into it a large amount of cold fresh air as long as the fan is operated. Each fan is made to turn on the reaction principle, and its efficiency and simplicity are undoubted by all who have thus far looked into the system. There would seem to be no question but that the device will prove extremely popular to the railroads and will greatly add to the comfort of travelers.

The Disinfection of Railway Cars

Moniteur Industriel, May 18, 1901, p. 77.

According to hygienic reports it is of the first importance that there should be a complete disinfection of these cars as soon as the animals have been removed, otherwise noxious germs may be transported to a distance and new disease centers created. Some of these germs are capable of developing in man and thus form a serious menace to the public health. This has been shown to be a fact in the case of carbuncles, glanders, inflammation of the buccal membrane, apthous ulcerations, farcy, itch, etc.

Considered from a technical standpoint the processes of disinfection should be so thorough as to destroy all disease germs that may be in the car. In Hungary, Germany and Russia very severe penalties are prescribed when the existence of infection in cars has been detected and a disease developed.

(1) Introduction of steam at a pressure of one or more atmospheres is used in Austro-Hungary, Switzerland and Italy.

(2) In the Netherlands the use of steam at 30 lbs. pressure and 250 deg. Fah., or steam at 320 deg. Fah., either clear or with slightly active chemical substances, combined with a mild chemical action.

(3) Projection of steam through pipes with or without the spraying of disinfecting substances. Used in Belgium.

(4) Boiling water under pressure. Used in France.

(5) Use of hot solutions of potash and soda in Switzerland and Belgium. The same is used simply for cleaning in Holland.

(6) In Austria, Switzerland and Belgium soda solutions and alkali washes are used. This method is not permitted in Hungary and Germany, except in the case of cars that have no infection.

(7) Use of chloride of zinc in Austria.

(8) Carbolic acid is used in Austria, Belgium, Italy and Switzerland and also in Hungary and Germany, but there only in the case of infected or suspected cars.

(9) Solutions of chloride of mercury are used in Italy and the Netherlands, and also in France, but in the latter country with the addition of hydrochloric acid.

(10) White washing is used in France and Holland.

(11) A solution of the hydrated hypochloride of soda is used in France.

(12) Simple washing and cleansing with water containing a solution of chloride of lime under pressure is used in Switzerland, Belgium and the Netherlands.

None of these processes, with the exception of the use of steam under pressure is sufficient for the work, according to the excellent system of sanitary inspection in vogue in Austria. Most of the strong chemical solutions will destroy the germs of certain transmissible diseases, but have no effect on those of glanders.

A Grain-Tight Grain Door

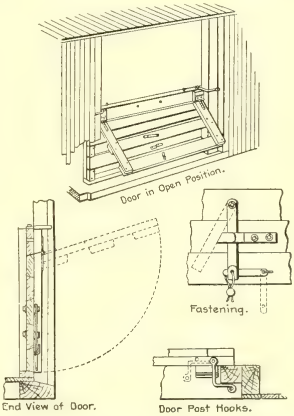
American Lumberman, Sept. 28, 1901, p. 25.

The Montgomery grain door, it is said, eliminates the faults of the ordinary grain door. It is perfectly tight when closed, and yet can be opened either inward or outward, it can be easily raised up out of the way when not in use, and it can be made to lie flat against the side of the car next to the roof. The door is hinged on an upright rod just inside the door, upon which the hinges can slide up and down. At the outer edge is a piece of wood the full depth of the door, which has two slots cut in it, thus giving it a motion in or out, so as to make a tight joint with the door post when in position, but which, by moving back, enables the door to be opened either way. The annual loss of grain from leakage, caused by defective doors or crooked edged boards, or loose knots which may fall out when under pressure, would more than pay for the doors of each car. Those who are interested in grain doors will be able to obtain further particulars by addressing the Montgomery Car Door Company, Commercial Building, Detroit, Mich.

A New Grain Door

Railroad Gazette, Sept. 20, 1901, p. 651.

A paper read last year before the Central Association of Railroad Officers pointed out the difficulties in the way of providing a cheap grain door which would be satisfactory in all respects. In that paper it was held that the permanent grain doors now in use are expensive and that they cannot be raised with a load pressing against their sides. The illustrations show an arrangement of grain door by Mr. E. V. Williams, Railway Exchange Building, St. Louis, which promises to meet all requirements. The door consists of two frames. The main one, resting against the ordinary car door posts, has an open space at the bottom, which is divided by a cross-bar into two openings of equal size. A swinging frame hinged to the main frame has cross-bars with beveled edges which close the openings of the main frame. The edges of the main frame bars are also beveled

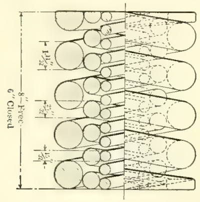


to permit of close joints and easy separation when required. A catch bar of wrought-iron bolted at one end to the upper cross-bar of the swinging frame engages a wrought-iron keeper bolted to the lower cross-bar of the main frame. This bar reaches half way across the width of the lower cross-bar of the swinging frame, securely holding the two frames as one door. A notched wrought-iron hasp prevents the cross-bar from moving from the keeper, and provides a means for sealing with an ordinary seal. Two hooks at the top of the door hold it in position against the door posts while the car is being loaded with grain. To relieve the load, the seal hasp is easily released and turned aside, the catch-bar is pushed from the keeper, when immediately the swinging frame permits the grain to flow from between the bars of the main frame. It is easier to open the door properly than to break it. The flow of grain is rapid, yet it can be checked by pressure against the swinging frame. A small opening permits the passage of some grain.

Large Capacity Draw Spring

American Engineer and Railroad Journal, Oct., 1901, p. 324.

In the recent report to the M. C. B. Assocation on draft gear it was stated that Mr. William Garstang, of the C., C., C. & St. L. Ry., is using draw springs of larger capacity than those of the recommended practice of the association, but without exceeding the dimensions of that practice. The new spring, which has three coils instead of two, has a capacity of 28,000 lbs., an increase of 9,000 lbs. over the usual practice. The free height of 8 ins. is retained and the outside diameter of the large coil is 6⅜ ins., ⅛ in. larger than before. This new spring employs coils having bars 1 11/32, 25/32 and 15/32



in. in diameter respectively and its normal weight is 40 lbs. The height when solid is 6 ins., and the height under a load of 28,000 lbs. is required to be 6 1/16 ins. It is obvious that this spring may be used in the ordinary draft gear having a yoke attachment, and that 50 per cent. increase in capacity over the usual practice is obtained very easily and cheaply. If used in a twin or tandem gear these springs would give a capacity of 60,000 lbs., a very respectable increase over the usual construction. The outer coil tested alone to 6 ins., requires a pressure of 16,700 lbs.; the second coil alone, 5,400 lbs., and the inner coil alone, 1,400 lbs. Compressed separately to 6 ins., the coils thus have in all 23,500 lbs. capacity, but when assembled, a little over 28,000 lbs. is required to compress the group to 6 ins. The difference is accounted for by the friction of one coil on another.

Shop Practice, Machinery and Tools

Burnishing Car Journals

American Engineer and Railroad Journal, Sept., 1901, p. 299.

For a time there seemed to be but one opinion, and that favorable, concerning the advisability of burnishing or rolling the journals of car axles. At the recent M. C. B. convention the following conflicting opinions were expressed:

Mr. D. F. Crawford, of the Pennsylvania, said: "The rolling of journals has proved very advantageous, almost entirely eliminating the trouble with hot boxes under new cars.

Where the journals have been rolled we have had no trouble in loading the cars at once to their marked capacity, plus the usual 10 per cent. The advantages thus derived are so great that it would seem that if other roads have derived similar advantages, it might be well to have the rolled journals adopted as standard recommended practice, so that individual companies, as well as smaller railroad companies, having cars built at outside shops, would insist on having journals.

Mr. Brazier, of the New York Central, stated that on that road journals are put into high speed lathes and polished with emery.

Mr. Canfield, of the Philadelphia and Reading, said, "We do not think it is good practice to use the roller. The object of using it is to smooth the journal and roll down any particles of the iron or steel that may be standing up. It does that and the practice would be all right if the journal always rolled in the same direction. Reverse the motion of the car, and these particles are liable to cut into the brass and give trouble."

Mr. Hennessey, of the Chicago, Milwaukee & St. Paul, approved of the practice: "We have had some experience in the use of rollers. We have built our equipment with exception of 500 cars, and for the last ten years have rolled all the journals without any additional cost. While doing the wheel fit we roll the journal at the same time. We have had a large number of cars taken from the works and loaded at once to half their capacity. We sometimes load them to their full capacity at the coal yards. In something over 20,000 cars rolled we have never had one cut journal and the number removed has not been worth considering."

A new process of finishing journals, that of grinding, has been recently offered and it seems to have important advantages over the rolling. It insures perfect roundness of the journals and it does not appear to be important which way they turn. Many of our readers saw the exhibit of piston rods and crank pins by the Norton Grinding Company at Saratoga.

Hot Bath Tempering

Machinery, Oct., 1901, p. 45.

A novel method of steel tempering is being used in connection with the gas-furnace by certain manufacturers, whereby the temper to which the work is to be drawn is reduced to an absolute certainty. The crucible of a crucible-gas-furnace is filled with melted beef-tallow, and this tallow bath may be maintained at almost any temperature required for drawing tempers, as tallow is capable of taking very high temperatures. The temperature of the bath is determined by a suitable pyrometer. In this way the exact heat required to draw the temper the desired amount may be definitely obtained, and this eliminates the element of guesswork from the process.

For instance, if it is desired the temper milling cutters, or taps and dies to their required straw-yellow, all that is necessary is to adjust the heat of the bath to about 460 deg. F., as indicated by the pyrometer. Le Chatelier's electric pyrometer may be read at some distance from the furnace. After this dip the pieces into the bath. They need only be left there for a length of time sufficient for the heat of the bath to thoroughly penetrate the work, although if the temperature of the bath is kept constant the work may be left in for an indefinite time. This method offers the great advantage that drawing temperatures which have been found to give good results may be repeatedly employed on particular work with absolute certainty of uniformity of results.

The Taylor-White Process for Tool Steel

Journal of the Franklin Institute, Sept., 1901, p. 161.

The Taylor-White process depends largely on the fact that although carbon and air-hardening steel deteriorate rapidly when the temperature rises above a cherry red, some chemical compositions of the latter class pass rapidly through this condition, the efficiency rising slowly at first, and very rapidly as the temperature rises, reaching a maximum at the point the tool crumbles when tapped with a rod. The point to which air-hardening steel was formerly heated in the process of hardening was between 1,550 and 1,600 degrees F. This was called the "breaking down point," and varies with different compositions of steel. In other words, the Taylor-White process consists essentially of heating the steel far beyond the point at which it was formerly supposed to become worthless. The method of cooling from the "high heat" being about 2,000 degrees F., however, plays a very important part in the process. The tool is cooled rapidly from the "high heat" to a point below the breaking down temperature in a lead bath and then slowly in the air or lime, etc., as the case may be. After cooling, its efficiency is found to be further increased by subjecting it, for about ten minutes, to what is termed the "low heat" or a temperature of from 700 to 1,240 degrees F. After cooling from low heat the tool is ready for use. In order to obtain the best cutting edge at least 1-16 of an inch should be ground off, as the surface is more or less deteriorated by the high heat.

The description of the process is given by Mr. Charles Day, of the Link-Belt Engineering Co., of Nicetown, Philadelphia, in a paper read before the Franklin Institute.

Economies Due to the Taylor-White Process

Railroad Gazette, Sept. 13, 1901, p. 631.

This paper by Mr. Charles Day gives special attention to the use of steel treated by this process used by the Link-Belt Engineering Co. About 97 per cent. of that company's material is cast-iron. For rough test on cast-iron one tool was put on a 7-ft. boring mill, turning the inside of a cast-iron ring. Ordinarily about 14 hours was required to finish the work. With the Taylor-White tool the time was reduced to 3 1-2 hours, a gain of 75 per cent. Another case where the usual time for turning thirteen rope sheaves had been 9 1-2 hours. Sixteen similar sheaves on which the roughing was done with Taylor-White tools, were machined in 5 hours and 5 minutes, a saving of 46 1-2 per cent. This record included the time for all stages of the operation, namely, setting up forming groove with special tool boring, polishing and roughing. The gain in the process of roughing alone, where the merits of the ordinary and Taylor-White tool were directly contrasted, was 56.3 per cent. The results with boring cutters made of this steel have been particularly pleasing, the actual time being reduced 60 per cent. for a given duty. A test was made in boring 1 3-16 in. collars in one cut, the core being 1 inch. The metal speed at point of cutter was 77 ft. per minute and the regular cutter lasted 10 seconds. The treated cutters bored four collars successively.

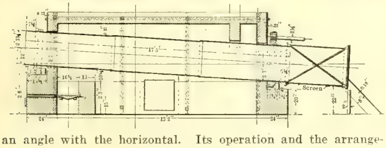
Improved Sand Dryer

American Engineer and Railroad Journal, Oct., 1901, p. 315.

With regard to the rotary sand dryer used on the Chicago, Milwaukee and St. Paul Railway the *American Engineer* says:

There seems to be a tendency toward the use of hotter surfaces for drying sand than can be had with steam pipes, because of the desire for quicker and more thorough drying. Steam pipes seem to work very well with crushed stone, such as the Pennsylvania road uses, but the general use of the pneumatic sander seems to require something better.

This rotary dryer was intended for a capacity of about 10 or 12 cu. yds. in 10 hours, but it has proved to be a little slower than that and the grate area will probably be increased, otherwise the device is entirely satisfactory. The dryer is a cylinder 27 1-2 ins. in diameter and 17 ft. 5 ins. long with open ends and supported in a brick setting on rollers at



an angle with the horizontal. Its operation and the arrangement of the screen at the delivering end are seen at a glance. At the ends of the cylinder, rings made of old 33-in. tires are secured, the upper one having the flange to hold the cylinder in position, while the lower one forms the attachment of the driving gear. In the inside of the cylinder angle irons are riveted in spiral form, giving about 1 1-2 turns in the length of the barrel. These agitate the sand and also delay its movement down the cylinder. Sand is shoveled into the high end, or it may later be delivered by an automotic conveyor. It gradually works down as the cylinder revolves and falls into a hopper placed under the screen, from which it is raised to the chutes by compressed air. Large lumps, stones or other undesirable matter passes out of the end of the screen into a wheelbarrow. When the hopper is full the valve is opened and the sand is allowed to fall into the cylindrical tank.

Machine Moulding

Cassier's Magazine, Aug., 1901, p. 311.

This article is by Mr. Joseph Horner. He says, among other things, that all kinds of castings are not profitably adapted to machine molding. Those of very large dimensions are generally excluded, notwithstanding that the capacities of molding machines have been greatly increased in recent years. Castings of great depth and intricacy are ill suited to this method. But work having a considerable amount of detail, provided it is shallow, is eminently adapted for the machine. It is not easy to state the case in general terms. But fairly deep work, provided it is plain, is much better lifted by machine than by hand. A machine will lift only vertically, while some patterns have to be drawn out at an angle, or with a special twist; or drawbacks or loose rings of sand will modify matters so much that the machine would rather complicate than simplify molding. Work with middle parts is not adapted for machine molding. Cylindrical sections are highly adaptable. The best of all is that which is shallow and easy to ram and deliver. And the highest economies are obtained by the grouping of numerous small pieces on one plate. It is obvious that for work in which the making, setting, and fixing of cores occupies more time than the actual molding of the pattern, the economies of machine molding are not so great as that in which the conditions are reversed. Though it is true that the more highly specialized the work of a foundry is, the greater are the economies effected by machine molding, yet too many firms make the mistake of thinking that machines are economical only when a large volume of work has to be done. A few dozen molds will often pay for putting the pattern on a machine, for, like turret lathe work, when a firm gets into the system, the time occupied in fixing up a given job tends to diminish.

Gates and Gating

American Machinist, Aug. 1, 1901, p. 862.

Mr. H. W. Bury, writing on this subject says, knowing how and where to gate a casting is a very important thing in moulding. For instance, a fly wheel, which for certain reasons

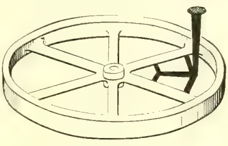


FIG. 1 HOW NOT TO GATE THE ARMS.

cannot be gated conveniently at the hub, so from necessity is "run" from the arms. Many moulders would cut a gate into the arms at right angles, as in Fig. 1, and in nine cases out of ten, the casting would be found full of slag and dirt adjacent to the gate. This is caused by the iron being diverted in its flow and forming an eddy where impurities accumulate. To avoid this the gate should be cut so as to strike the arms at

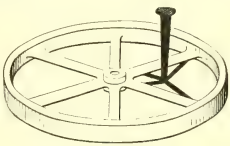


FIG. 2. BETTER GATING.

such an angle that the flow of metal will not be abruptly turned, as shown in Fig. 2. This mode of gating applies only to wheels weighing 1,500 lbs. or less. A large fly-wheel should be gated either at the hub or in the rim and, if the latter, it will be necessary to pour "double," on acount of the distance the metal would otherwise have to travel.

In one of the Frank H. Spearman's railroad stories there figures a certain conductor who always wanted to be on time—time was his hobby, and it was said of him that he was so careful of it that when he was off duty he let his watch stop, just to save time.

Electric Equipment, Machinery and Appliances

Light Distribution

Western Electrician, Sept. 14, 1901, p. 170.

Mr. J. C. Fish says the incandescent lamp is the only source of light that can be used in any position and that does not cast shadows beneath it. It is very desirable to have sufficient light to illuminate all parts of a room, but the amount of illumination necessary on walls and ceilings is less than is generally supposed. What we most desire is illumination of two distinct classes. One should be the illumination of objects upon which we wish to concentrate our attention, and the other the illumination of objects we desire to see without concentration. With the ordinary incandescent lamp the best results are obtained when it is in the neighborhood of four feet directly above the objects we wish to make visible. At this distance the dazzling effect is prevented. These lamps have received their candle-power rating by the light distributed horizontally.

FIG. 1.

FIG. 2.

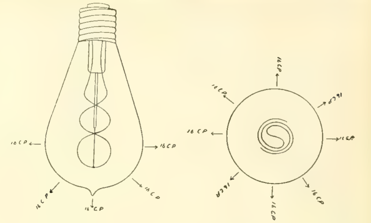
Fig. 1 shows an ordinary lamp hung in position and location most customary. This lamp is rated at 16 candle-power, that is, light radiated horizontally. The same lamp is rated by the light emitted through the end measures only 7 candle-power. Therefore, barring the horizontal rays which strike the machine after having been reflected, the lamp is practically only a seven candle-power lamp as far as the workman is concerned though consuming current for a 16 candle-power light. In workshops there is very little reflection. If the presence of shadows in the shop is not an objection the ordinary anchored fillament lamp can be arranged by means of a cord, so that it will distribute its full 16 candles directly upon the work beneath it, as shown in Fig. 2. Any 10 candle-power lamp when arranged this way will distribute considerably more light than a 16 candle-power light used in the vertical position. Here lies a suggestion for economy.

The Sterling Incandescent Lamp

Electrical World and Engineer, Oct. 5, 1901, p. 565.

For the past several years much has been written and much more has been said to central station men on the subject of the distribution of light from incandescent lamps. Authorities on illumination have, as a rule, contended that the candle-power of an incandescent lamp should be expressed in terms of spherical candle-power, but the objection has been urged against this, that even assuming the method to be the only correct one, the difficulty of determining spherical candle-power is so great as to render this system of rating impracticable so far as central stations are concerned. It has been contended that the only rational system of rating is one made in terms of the light from the tip of a lamp.

The Sterling Manufacturing Company, of Warren, Ohio, has placed on the market a lamp which, it is claimed, harmonizes all of the strong points in the arguments offered or the different methods of rating above outlined. The lamp is shown in



the illustrations, and the distribution of light is represented in both a vertical and a horizontal plane. It shows that in a vertical plane the form of filament used giving an equal illumination at every angle, except, of course, that corresponding to the base of the lamp. It also shows that the illumination is precisely the same at all angles in a horizontal plane. It is claimed that this is the only lamp made that will give the same measurement in candle-power when revolved or stationary and at any angle.

Wood Drying by Electricity

Consular Reports, Sept. 9, 1901, p. 3.

Mr. Mahin, United States Consul at Reichenberg, gives the following description of wood drying by electricity as practiced in Austria:

"The green wood is placed in a large wooden trough, whose bottom is covered with a lead plate, which is connected with the positive pole of an electric battery. Covering the wood is a second lead plate, which forms the negative pole. The wood is then subjected to a bath in a solution composed of 10 per cent. rosin and 75 per cent. soda. Under the influence of the electric current the sap is drawn out of the wood and rises to the surface, the solution being absorbed by the wood. The operation requires from five to eight hours. The wood is then allowed to dry for about two weeks, when it is ready for use; or the drying can be done artificially in a much shorter time.

Electric Locomotive for the "Tuppany" Tube

Trade Journal's Review, Oct. 15, 1901, p. 89.

The new electric locomotive which has been introduced on the Central London Railway with a view to diminishing vibration, differs from its predecessors in having lighter armatures, which run at three times the speed of those used in the old engines. Gearing is used to reduce the speed to that necessary at the driving wheels. The multiple-unit system is also about to be tried on this line. The train is to be made up of two motor coaches and four trailers, the total weight of which will be 96 tons, or 30 tons less than that of one of the present trains, with equal seating capacity.

Electric Lighting for Railway Cars

Moniteur Industrial, August 31, 1901, p. 133.

Electric lighting has during the past few years shown itself to be superior to all of its rivals as a means of passenger car illumination, and investigation has shown that, except in a few special cases, it is no more expensive. The German imperial administration of the postal service gives .044 francs (0.88 cents) as the cost per candle power per hour, using lamps of 12 candle power, while the cost of lighting by gas is placed at .056 francs (1.12 cents). The number of cars equipped with electric lighting in Germany is placed at 1,476. On the Jura-Simplon Ry. the cost of electric lighting is estimated at one-tenth of that given above, while M. Sartiaux places it at 0.58 cents on the Northern Ry. of France. He admits, however, that when electric lighting is carried on on a small scale it is more expensive than gas. The different systems of electric lighting are classified as follows

(1) Lighting by means of dynamos and accumulators.

(2) Lighting by accumulators only.

The first system, where a special dynamo car is provided, has been tried in England and America, but has been abandoned on account of the expense. On the Siberian Ry. an experimental car has been introduced, in which there is a boiler and a Laval turbine driving a dynamo, but this is limited to special cases.

A dynamo driven by the axle and generating a current for the charging of accumulators was tried in 1886 on some cars in Germany and Austria. The mechanism for the regulation of the current so that it should be independent of the speed, was so complicated that the system received no further application.

Several systems have been designed to overcome this difficulty. In the Stone system, for example, an accumulator is provided which works while the train is at rest and until it has reached a certain speed. When this speed has been reached the tension of the dynamo equals that of the accumulators, and a centrifugal governor throws the two into parallel. As the speed increases so does the tension of the dynamo and the battery then begins to charge while the lighting is done direct from the dynamo by the insertion of a small rheostat in the circuit. Finally if the speed becomes so great as to endanger the accumulators and lamps the dynamo is moved nearer the axle and the pulley allowed to slip.

Conducting Transportation

Mechanical Handling of Baggage

Revue Generale des Chenims de fer, July, 1901, p. 34.

The Orleans Railway has installed a system for the mechanical handling of baggage at the Quai d'Orsay station in Paris. The station is arranged with the waiting room on the ground floor, while the tracks with their platforms are below. This makes it necessary that all of the baggage, whether incoming or outgoing, should be raised or lowered for the distance between the two floors which is about 17 ft.

In order to do this three separate methods are employed. There are electric elevators which are used for moving baggage in both directions, chutes for lowering it only, and conveyors for raising only. The latter are supplemented by traveling platforms in the baggage room by which the parcels are moved to the sorting and delivery tables.

There is nothing peculiar or novel in the construction of the elevators. They have each a capacity of one gross ton and may be run at either one of two speeds. The higher is one meter (3.28 ft.) per second and the other half as much. The slower speed being, of course, the one that is used with the heavier loads.

The chutes have been very carefully worked out in accordance with experience gained elsewhere with other forms of parcels than baggage. They are simply troughs formed of iron plates to the inner surfaces of which half-round wearing or sliding strips are riveted. These chutes may have any desired contour from a straight line to a helix. In fact, the latter form is actually used in one case. As for inclination, it has been found that an average of 40 per cent. will cause an ordinary trunk to slide, if the grade is slightly increased on curves. But, owing to the different coefficients of friction of the various parcels that go as baggage, it has been found to be perfectly safe to increase the inclination to 60 per cent.

At the foot of the incline the package is stopped by running it out on a horizontal section which is connected to the inclined portion by a curve. This horizontal section is also covered with a piece of rough carpet about 6 ft. long, by which the most rapidly moving trunk is stopped.

The conveyors are of the belt type that have been used for a long time for sand, coal, minerals and the like. The belt itself is formed by sewing lengths of ¾-in. manilla rope together. Its width is 35 inches and its speed of travel about 1 meter (3.28 ft.) per minute. It is driven by an electric motor. The inclination of these conveyors is from 47 to 50 per cent. and a slight sprinkling with water once a day serves to hold the belt to length and give it sufficient adhesion to prevent the slipping of the baggage. They are run over a plain wooden drum, crowned at the center, for a driving pulley, while the carriers are simple cylinders, spaced one meter (3.28 ft.) between centers. The capacity of these conveyors is very great, they can handle the baggage with much greater rapidity than it can be loaded upon them from the vans.

Per Diem or Mileage?

Railway Age, October 25, 1901, p. 448.

In a circular recently issued by the Eastern Association of Car Service Officers, the question is asked, "Why, since the per diem plan would be such an improvement, is it not put into effect?" The only answer suggested by Mr. Higsbee, the secretary, is that "The executive officers whose sanction is necessary have not made themselves thoroughly acquainted with the details of the situation, or, having been acquainted therewith, have put it aside for matters of seemingly more immediate importance."

The average reported daily movement of freight cars for the entire country is less than thirty miles. We say, says the writer, "reported movement," for there is no small reason for belief that a considerable portion of the movement of what is known as foreign cars is not reported. Numerous instances of this condition have been located and very many more occur of which nothing is known. Supposing the average movement of freight trains to be fifteen miles per hour, this amount of mileage contemplates the actual use of a car only two hours out of the twenty-four, the rest of the time it is lying idle. The mileage system of compensation is no small factor in contributing to this condition. To return a car over a road for which it has no immediate use, renders that road liable for the payment of mileage in the succeeding month, and also subjects it to expense for the haul. Nothing is more natural, therefore, that that such movement should be delayed until a more convenient season.

The substitution of the per diem for the mileage system would have a salutory effect on the conduct of traffic. It is not claimed that the per diem system is the best one that could be devised. A clearing-house covering well defined districts would be better. The per diem system possesses an advantage at the present time of having more advocates than the car clearing-house, inasmuch as it is in every way better than the mileage plan. If adopted, it would pave the way for the clearing-house.

Medical and Surgical Matters

First Aid to the Injured

Railway Surgeon, October, 1901, p. 137.

The International Association of Railway Surgeons has prepared a syllabus of instruction in First Aid, as follows:

First Lecture.—Introductory remarks; objects of instruction; a general outline of the structure and functions of the human body, including a brief description of the bones, muscles, and blood vessels; the functions of the nervous system; the skin, absorption, circulation, respiration and excretion; general uses of the Esmarch triangular bandage, and practical instruction in its application.

Second Lecture.—Importance of surgical cleanliness; general directions in rendering First Aid; the course of the main arteries, indicating the points where the circulation may be arrested by digital pressure, or by the application of a tourniquet; the difference between arterial, venous and capillary bleeding and the various extempore means of arresting it; practical instruction in the arrest of bleeding, digital pressure, the tourniquet and the triangular bandage.

Third Lecture.—The signs of sprains, dislocations and fractures, and First Aid to be rendered in such cases; the improvising and application of splints and other restraining apparatus; First Aid in wounds, burns and scalds; what to do

when the clothing catches fire; removal of foreign bodies, practical instruction in the application of improved splints, dressings and the triangular bandage.

Fourth Lecture.—First Aid to the unconscious; the immediate treatment of those apparently drowned or otherwise suffocated or disabled; those suffering from collapse from injuries, those stunned, the apoplectic, epileptic, hysterical fainting, those suffering from poisoning; practical instruction in the performance of artificial respiration, and the application of the triangular bandage.

Fifth Lecture.—Method of lifting and carrying the sick or injured; carrying by stretchers; conveyance by rail or otherwise; preparation for their reception; practical instruction in lifting, carrying, and conveying by improved methods.

[The only thing that appears to us to be wanting in the admirable course outlined above, is definite instruction as to what should be done with persons struck by lightning or stricken with dynamic electricity in any form. There is abundant proof that persons so injured are not always dead, and information as to how to treat them cannot be too widely known. In this connection we recommend a perusal of the rules issued by the general manager of the Liverpool Overhead railway (electric), a resumé of which appeared in the *Digest* for May, 1901, p. 192, and also an editorial on the same subject in that issue.—EDS. RAILROAD DIGEST.]

Blue Electric Light

Electrical Review (London), October 4, 1901, p. 562.

According to the *Medical Press*, very extensive therapeutic effects are to be derived from the use of "blue electric lights," and if the favorable experiences recorded by Dr. A. V. Minine in *Vratch* of June 23d are confirmed by subsequent investigations, a great advance in the art of healing has been made. Dr. Minine has found that while blue light produces an anæmia in the parts exposed to it, white light causes the tissues to be filled with blood. The chief advantage claimed for blue electric light lies in its action on the vaso-motor nerves. A further benefit to be secured by the use of this light is that it has a very marked anæsthetic effect, and Dr. Minine has employed it in the stitching of wounds, instead of cocaine. Burns and scalds heal rapidly and painlessly without any local application being necessary, under the influence of this new method of treatment. It appears that the removal of stitches can be carried out without causing any pain by utilizing the action of this light. If a contusion be exposed to the light, the occurrence of a black and blue spot or of a hæmatoma, is hereby prevented.

Miscellaneous.

Wasted Heat

Canadian Engineer (Toronto), Sept., 1901, p. 392.

This article is by Mr. A. M. Wickens. He says, Sir William Herschel tells us that if a cylinder of ice 45 miles in diameter and 200,000 miles long were presented endwise to the sun it would be melted in one second of time. The work of engineers during the last 50 years have been in a great measure directed toward the improvement of the steam engine. Their efforts have resulted in a reduction of water consumed per horse-power per hour from over 60 to 12 1-2 lbs. Taking the average of American coal we find it composed of carbon 80 parts, oxygen 5 parts, hydrogen 7 parts and ash 8 parts with some sulphur. When burned the oxygen and carbon unite to form carbonic acid gas (CO_2). The heat units contained in one pound of carbon perfectly burned is 14,800. If air be reduced to 1-2 the required quantity, to 5.7 lbs., or 76 cubic feet, the product would be carbonic oxide (CO). The heat units of carbon burned to carbonic oxide are only 4,800, thus wasting 10,000 heat units for every pound of carbon thus imperfectly burned. In tests conducted at the Centennial Exhibition in 1876 it was found that passing 24 per cent. more air through the fire than was theoretically required had no effect upon the evaporative efficiency of the boiler. In a test of fifteen boilers there it was found that by reducing the rate of combustion 30 per cent. the quantity of water evaporated was only 23 per cent, and at the same time the efficiency was increased 81 1-2 per cent. This proves there is no economy in forcing a boiler. In Germany a test of nearly four years' duration on two tubular boilers, steaming night and day, showed that 60 per cent of the heat was utilized, and that more than half of the remaining 40 per cent. was lost through the brick walls. The average heat of escaping gases was 360 degrees F., and carried off 5 1-2 per cent. The proportion of grate surface to heat surface was changed three times, the most economical being 10 feet grate to 340 feet heating surface. The ratio between tube heating surface and shell surface should be about 5 to 1. It is not possible to attain perfect combustion with the theoretical amount of air, which is 11.16, or 152 cubic feet per pound of coal, because in the conditions obtained in our furnaces we cannot get the air into perfect contact with the burning carbon of the coal. For this reason we have to supply about double the theoretical quantity of air, or 24 lbs., per pound of coal. If more air than is needed is allowed into the furnace it simply carries heat from the furnace to the chimney, while if too little is used we get carbon monoxide instead of carbon dioxide, causing a most serious loss.

[In such cases, where an insufficient quantity of air is admitted, the loss sometimes becomes apparent by the formation of dark red flames at the mouth of the chimney. Flame issuing from a chimney is not necessarily evidence of extreme heat in the furnace. It is rather the result of incomplete combustion, where only carbon monoxide is formed. This gas, held at high temperature while passing up the hot walls of the chimney, bursts into lurid flame when it at last comes in contact with free oxygen. It is not the result of an intensely hot and long flame, which leaps freely forth to the air. It is produced by smothered combustion in the furnace, with great loss of heat to the boiler. The laws of nature are always inexorable; CO burns to CO_2, high in air; and completes, at the chimney's mouth, the total number of heat units, which ought to have been effectively liberated in the firebox.—EDS. RAILROAD DIGEST.]

Nickel Steel

American Machinist, Sept. 19, 1901, p. 1058.

Mr. H. F. J. Potter's article originally appeared in the *Engineering and Mining Journal*. Nickel steel is generally made in the open-hearth furnace, and has the composition of ordinary open-hearth steel of about 0.25 carbon and from 3 to 5 per cent. nickel. Nickel steel has a lower melting point than carbon steel of the same carbon composition. In the cooling process nickel tends to reduce segregation and liquation, so that a nickel steel ingot is more homogeneous throughout than an ingot of simple steel and there is less tendency to blow holes. Nickel steel is very sensitive to changes of temperature. In rolling and forging it demands great care in order to keep all parts at the same temperature. This care in handling during the process of manufacture adds to the expense of the finished product, more than the price of the nickel in the steel. Nickel does not have a hardening effect on steel; and nickel steel forgings, although tempered in oil and annealed, are not hard to machine. They are, however, exceedingly tough and more power is required to machine nickel steel of a certain carbon composition, than simple steel of the same carbon composition. For the ordinary run of commercial forgings, from 3 to 3.5 per cent. nickel, and 0.25 carbon is used. This produces a metal of an elastic limit and tensile strength equivalent to a simple steel of about 0.50 carbon. This grade of nickel steel will have from 20 to 30 per cent. greater elongation than simple steel of the same tensile strength, and will have 40 per cent. greater strength than simple steel of the same carbon content, with practically the same elongation and reduction of area. The modulus of elasticity is slightly lower than that of high carbon steel, which will tend to cause it to be considered of less value than the latter in resisting fatigue of metal. High carbon steel is so

much more difficult to manufacture on account of the segregation and liquation that resultant forgings are not as satisfactory as those made of nickel steel. Nickel steel forgings of high elastic limit are considered best for service where rapid alternations of tensile and compressive stresses are applied.

Internal Strains of Iron and Steel

American Machinist, Sept. 19, 1901, p. 1053.

This article is an abstract of a paper read at the Engineering Congress at Glasgow, by Mr. Arthur Wingham, F. I. C. He says, "There are two kinds of equilibrium to which a metal attains, chemical and physical. The natural tendency of a complex metal is to assume its most simple forms of combination preferentially capable of existing at a given temperature; that its rapidity of cooling, even under the slowest conditions is too great to allow this to reach finality; that the equilibrium is further repeatedly interfered with by changes of atmospheric and other conditions; that the adjustment to physical equilibrium tends to assist the adjustment of chemical equilibrium; the adjustment which is assisted by slightly raised temperatures, also, as a consequence takes place in the cold; and that the eutectic is the medium through which the chemical or molecular change takes place, working, of course, in conjunction with the vibration of the molecules." A strong and tough structural steel well within the mechanical limits of the specification to-day, may in the course of a few years, develop some of the properties more generally associated with cast-iron. The writer thinks this has been shown by the recent accident to the Brooklyn Bridge. The rods which broke, no doubt had a plentiful margin of original strength. It is probable that the repeated vibration and the release of internal pressure by the persistent tensile strain accelerated an excessive tendency of the metal to crystalize, and so reduced its tensile strength. Other suspension rods in the bridge are probably approaching the same end. The selection of the best metal in view of longevity might prevent the comparatively early break down of such an important structure.

[With reference to the word *eutectic* used above, the Standard dictionary says, "Melting readily or at a low temperature, said of a compound substance that has a lower fusing point than its components have themselves."—Eds. Railroad Digest.]

Compressed Air vs. Electricity

Machinery, August, 1901, p. 386.

Compressed air and electricity each have a field for the operation of tools and appliances in which, it is believed, one cannot compete with the other on account of natural limitations. Electricity is peculiarly suited to the operation of traveling cranes. Compressed air is believed to be peculiarly adopted to the operation of reciprocating tools, such as hammers, riveters, beaders, rock drills, etc. An advantage of compressed air for rock drills in mines, is the constant escape of pure cold air from the cylinders, which is not an insignificant item in the maintenance of fresh air for the workmen. Electricity is, however, also used for the operation of reciprocating rock drills. Its use in this direction promises to largely supercede compressed air, on account of the flexibility of the necessary connections and the ease of erecting main-feed wires, as opposed to the laying of air pipes. A leaky air pipe is harder to make tight than a steam pipe is.

The reciprocating rock drill uses a three-phase alternating current. It has two coils of wire forming solenoid magnets, through which a solid steel plunger reciprocates. The plunger carries the drill. The remainder of the apparatus is similar to the ordinary rock drill, in the matter of turning the bit and feeding it. A three-phase generator is used for these drills, which is run at comparatively slow speed. Each drill on the circuit strikes a blow for each rotation of the armature and all strike at the same time. The whole apparatus is absurdly simple and it raises a doubt in the minds of engineers as to the further supremacy of compressed air in its hitherto conceded field. It apparently behooves the wideawake machinist to become thoroughly familiar with the principles of electricity and the features of electrical apparatus, as it will be more and more necessary for him to have such knowledge as time passes by.

[A solenoid consists essentially of a conducting wire, forming a close cylindrical spiral, and having its ends brought to its middle. When traversed by an electric current, it has all the properties of a magnet. In the June *Digest*, p. 232, an example of an electromagnetic solenoid is given, which is used in iron working plants. In the July *Digest*, p. 278, the solenoid is considered, and criticized from an economical point of view.—Eds. Railroad Digest.]

Engineering Education

Railroad Gazette, July 12, 1901, p. 495.

At the ninth annual meeting of the Society for the Promotion of Engineering Education, held recently in Buffalo, a paper entitled "The Cultural Value of Engineering Education" was read by Prof. Frank O. Marvin, of the University of Kansas. He summarized the fundamental qualities of culture as follows: thinking and reflecting, the ability to form right judgments from sound principles of right and wrong, the seeing of things in their right relations and due proportions, a taste and aptitude for the best literature, an appreciation of beauty, and agreeable manners. The address concluded with a strong plea for a more thorough preparation in the young man's college course, if he would be classed with cultured men. Prof. Allen stated that the railroads are drawing their men more and more from the technical school, and that he did not believe that education weakens executive ability. The last paper at the morning session was by Prof. J. P. Jackson of the Pennsylvania State College, on "The Arrangement of Undergraduate Courses in Electrical Engineering." It was strongly favorable to a direct application of theory to commercially practical problems and to a close relation between mechanical and electrical courses. The first two years should be given to a theoretical study, bringing out principles, and the last two years to problems of commercial value.

Conservatism in Steam Engine Designs

Electrical Review, July 13, 1901, p. 30.

The first use to which steam engines were applied was for the pumping of water in coal mines. The earlier inventors simply reversed the pump, fed it with vapor from their boilers, and obtained a reciprocating motion exactly adapted to the work in mines, but inadequate for the many uses to which steam engines were presently to be put. Hence the engine designers in the early days had to translate the reciprocating motion of the piston into a simple and continuous rotary motion such as was necessary for the driving of the larger part of the machinery to which engines were applied. With characteristic human conservatism, the reciprocating engine was the only type even imagined. In consequence, the machine developed from the mine pump was put on wheels, and connected thereto to form a locomotive, or set in a hull and connected through levers and cranks to paddle-wheels to make the steamboat. Absolute necessity alone has forced engine designers out of the narrow groove in which they were placed. With the coming of the polyphase systems, and the discovery of the value of direct coupling for the operation of steam-driven electrical units, it was found that an absolutely steady rotary motion was requisite. Thus recourse was had to flywheels, which absorbed a large amount of energy, due to the friction in enormous bearings necessitated by their weight But recent designers have learned to construct steam turbines which possess inherently a steady continuous rotary motion Nevertheless their introduction into electrical stations has been very slow and cautious. The first vessel equipped with steam turbines broke all records for speed. Nobody has, as yet, designed the steam turbine locomotive, but doubtless it will come in time.

A highly esteemed clergyman takes a great interest in the members of his flock who are engaged in a railway cutting. The other day he saw one of them entering a "pub" and hailed him; but Pat simply looked back and walked in. Waiting until he came out, the reverend gentleman accosted him thus: "Pat, didn't you hear me calling?" "Yes, your rivrince, I did; but—but I had only the price of one!"—*Tit-Bits.*

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

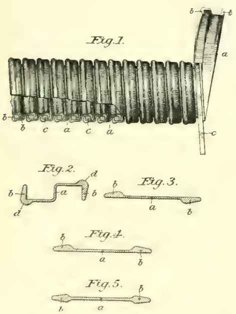
Flexible Tube

No. 680,984.

CHARLES T. SCHOEN, of Philadelphia, Pa.

The invention therefore consists of a rolled tube strip having its edges thickened and the bends or angles of greatest thickness; and the invention also consists of a flexible tube comprising a spirally-wound strip of rolled metal, having its interlocking flanges rolled thicker than its body and of greatest thickness at their corners or bends.

A rolled metal strip, for use in forming a flexible tube by spirally winding said strip, provided with integral, homogeneous, thickened flanges of greatest thickness at the corners or angles d, substantially as described.



A flexible tube, comprising a spirally-wound metal strip, the edges of which are integrally and homogeneously thickened to form reinforced flanges and having their greatest thickness at the corners or angles, said flanges interlocking with interposed packing, substantially as described.

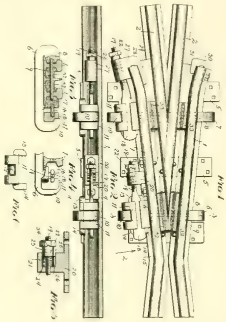
Clamp for Railway Frogs

No. 682,136.

GEORGE B. DONNELLY, of Chicago, Ill., Assignor of one-half to THOMAS J. PEDEN, of same place.

The main objects of the invention are to provide improved clamping mechanism designed to withstand the strain on the rails and to make such mechanism readily adjustable and to some extent self-adjustable to compensate for ordinary wear on the clamping parts.

The invention consists in:



The combination of a pair of diverging rails; a clamp connecting said rails; a wedge acting between one of the rails and the clamp jaw; a spring normally tightening said wedge in its seat; and means for adjustably locking said wedge between said rail and clamp jaw.

The combination of a pair of diverging rails; a clamp connecting said rails; said clamp being secured against movement longitudinally of said rails; a wedge acting between one of the rails and the clamp jaw; a spring normally tightening said wedge in its seat; and means for adjustably locking said wedge between said rail and clamp jaw.

The combination of a pair of diverging rails; a clamp connecting said rails; a block removably seated between one of the rails and its clamp jaw and having a seat for said clamp jaw; and a wedge acting between said block and the adjoining rail and thereby urging the block against said clamp jaw.

Station-Indicator

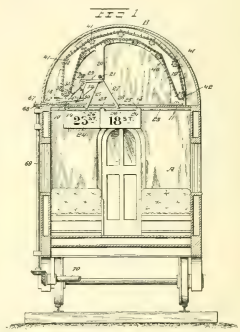
No. 681,539.

PAUL PHILA ICAVILLE FYFE, of Concord, N. C.

The purpose of the invention is to provide a station indicating device for steam, trolley, or cable cars, or cars otherwise propelled, so constructed that in conjunction with trips or stops located upon a track, cards bearing the names of streets, crossings, avenues, or stations will be automatically displayed within the vehicle proper at or upon the vehicle arriving at such streets, crossings, avenues, or stations.

A further purpose of the invention is to accomplish the above results by means of mechanism attached to any car and which will be durable, economic, and comparatively simple in construction.

The invention consists in a station indicator, the combination, with a display mechanism, a slide adapted to operate the said mechanism, the said mechanism comprising angle levers, signs carried thereby, and actuating arms adapted for engagement with the slide, a frame, endless belts having guided movement on said frame, bars connecting the said belts, and pins arranged in different planes on the said bars and adapted for engagement with different actuating arms, of a drive-shaft for the said belts mounted in the said frame, ratchet wheels located at one end of the said shaft, having their teeth inclined in opposite directions, opposing and connected dogs adapted one for engagement with each of the said ratchet wheels, a shifting device for the dogs, whereby either



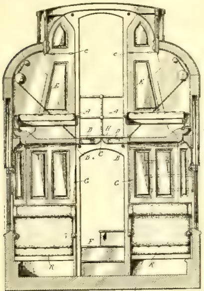
one may be brought in position to engage a ratchet wheel, and a support for the guide and for the dogs, which support is attached to said slide, opposing and connected detents pivoted on the frame, adapted one for engagement with each of the said ratchet wheels, and a shifting device for the said detents, whereby either one or the other may be brought into a path for engagement with a ratchet wheel, the adjustment of the detents corresponding to the adjustment of the said dogs.

Sleeping-Car

No. 682,163.

CHARLES WEIR BEALL, of New York, N. Y.

The invention consists in improvements in sleeping cars whereby the discomforts of night travel can be reduced to a minimum without diminishing the standard passenger carrying capacity of the car. By employing the improve-



ments a sleeping car can be built within the standard over all dimensions at present in vogue and provide sleeping accommodations for as many passengers as the ordinary Pullman sleeping car, giving each passenger a full section instead of compelling two to share a section. The upper berths of a car embodying my improvements will be found to be at least as comfortable as the lower berths.

The claims read:

In a sleeping car, the combination with upper and lower tiers of berths, of an upper floor, constructed in sections hinged to swing from the sides of the car and to meet when swung down, so as to form a platform from side to side of the car.

In a sleeping car, the combination of lower berths, swinging upper berths, a hinged sectional floor between the two, adapted to form a platform from side to side of the car.

In a sleeping car, the combination of lower berths, swinging upper berths, a hinged sectional floor between the upper and lower berths, which when lowered forms a platform from side to side of the car, partitions for the lower berths, hinged to the lower sides of the sections of the folding floor, and jointed removable partitions for the upper berth sections.

Car-Truck

No. 681,342.

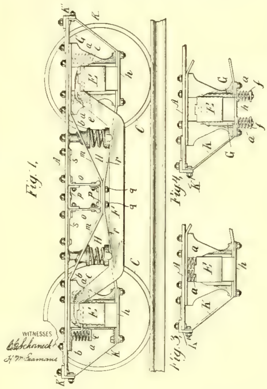
EDGAR PECKHAM, of Kingston, New York.

This invention relates to the construction of a car-truck designed specially for heavy work and for use as a motor-truck, although it may advantageously be used in connection with trail-trucks and in other relations.

An object of the invention is to provide a truck of a general type similar to that known as the standard "Master Car Builders'" truck, which will not allow the truck frame to tilt or pitch forward when the brake is applied to the wheels, thereby obviating one of the disadvantages of the said "Master Car Builders'" truck.

A second object is to provide in connection with the equalizer bar and truck frame of the "Master Car Builders'" truck special strengthening devices, whereby this truck may be adapted for special uses.

In combination, in a truck, with a top frame, wheels, axles, pedestals and journal boxes, an equalizer bar made up of



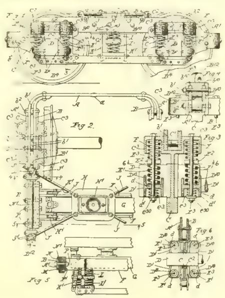
two spaced members F F, braces m, r located between the members of the equalizer bar, angle iron transoms o o, and connecting pieces p p therefor, of which the upper one is connected to the truck frame and the lower one to said braces.

Car-Truck

No. 682,348.

ARTHUR A. AMBLER, of Chicago, Ill.

In a car truck, an integral, endless, vertically edgewise frame bar encompassing the wheels, the ends or transverse portions of such integral frame bar being drooped below the level of the sides or longitudinal portions; pedestals having the sides or longitudinal portions of such frame bars secured to them at the top, and rigid longitudinal bars meshing at the bottoms of the pedestals at each side, the ends of transverse portions of the integral frame bars being intermediate in level between the longitudinal portions of said integral bar and said lower longitudinal bars.



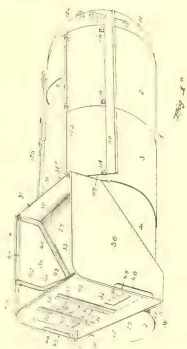
Tender for Locomotives, &c.

No. 681,760.

CORNELIUS VANDERBILT, of New York, N. Y.

The invention relates to improvements in the construction of tenders for locomotives, although in certain aspects the improvements may be otherwise employed; and it has for its object to produce a tender (or structure for kindred uses) wherein greater carrying capacity for both fuel and water is obtained, the cost of construction and maintenance reduced, facility of construction increased, the utilization of commercial forms of iron made a leading feature, and lightness and strength, together with economy in handling and carrying both the fuel and water, are all secured. These several results are obtained by means of the construction hereinafter described, and which constitutes a preferred form or embodiment of the invention.

The claims read as follows:



In a locomotive tender, the combination with the tank, the fuel box superposed over one end of the tank, an inclined septum dividing the box from the tank, and having a horizontal terminating plate, the box having the front end plate, boxes located in the front corners of the fuel box at each side of its longitudinal center, the terminating plate

forming the bottom of said box, an aperture in the front plate leading into the fuel box, and separate apertures in the said front plate at each side of the first mentioned aperture leading into said separate boxes.

In a locomotive tender, a superposed fuel box at one end, an inclined bottom dividing the fuel box from the tank, and a forward horizontal extension of said bottom, separate boxes located at the front corners of the fuel box, and at each side of the longitudinal center, said boxes having top plates inclined downwardly and inwardly in a plane transverse to the longitudinal axis of the tank.

In a locomotive tender, comprising a tank and a superposed fuel box, separate boxes located at the front corners of the fuel box and at each side of its longitudinal center, the bottom of said box being formed by said septum, and transversely disconnected and inwardly and downwardly inclined top plates for said boxes.

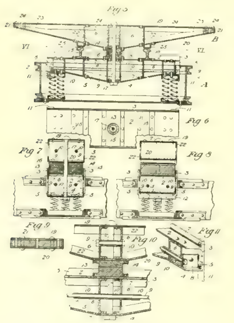
Bolster

No. 682,318.

CYRUS M. CARNAHAN, of Allegheny, Pa.

A bolster consisting of upper and lower structural members, intervening brace members, and tie-rods passing through and connecting the brace members with intervening sleeve strut members.

A bolster consisting of upper and lower structural members, intervening



channel members riveted to such upper and lower members, supplemental end reinforcing plates, tie rods passing through all of the intervening channel members and reinforcing plates, and intervening sleeve strut members surrounding the tie rods between the channel members.

A bolster consisting of upper and lower structural members, intervening brace members, tie rods passing through and connecting the brace members with intervening strut members, and a center bearing plate secured to one of the members.

The combination of a truck bolster consisting of upper and lower structural members, intervening brace members, tie rods connecting the brace members with intervening strut members, and upper center and lateral bearing members, with a body bolster consisting of upper and lower structural members, intervening brace members, tie rods connecting the brace members with intervening strut members, and lower center and lateral bearing members, with a central bolt passing through the body and truck bolster and the center bearing members.

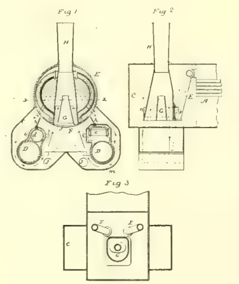
Steam-Locomotive

No. 683,658.

SPENCER OTIS, of Chicago, Ill.

This invention relates to the construction of the front end or smoke box of locomotives and to the extension of said smoke box to enclose the cylinders and steam chests thereof within said smoke box.

The object of the invention is to provide said smoke box with passages around the cylinders through which the hot gases and products of combustion are directed under and around said cylinders to keep them hot and prevent condensation of steam therein.



It relates also to means of regulating the amount of hot gases circulating around said cylinders and steam chests.

The claim reads:

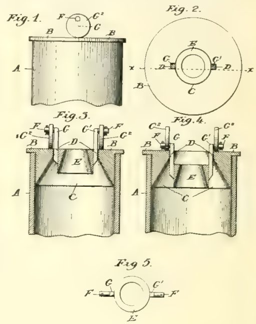
The combination of a portable steam-boiler and its smoke box at the front end, cylinders and valves therefor having their top on a lower level than the bottom of said boiler, the said smoke box completely surrounding said cylinders and valves, whereby the products of combustion are conducted downwardly along one side of each cylinder and valve, thence under the cylinder, and upwardly on the opposite side, to the smokestack.

Exhaust-Nozzle for Engines

No. 682,107.

WESLEY W. MORROW, of Springfield, Ill., Assignor of one-half to WILLIAM E. KILLEN, of Jacksonville, Ill.

The invention relates to an improvement in exhaust nozzles for engines, and has for its object to provide a device which will regulate the opening of the



exhaust pipe, and thereby increase or diminish the exhaust of steam into the smoke stack for the purpose of regulating the blast on the fire, and also to provide a device which is very simple and inexpensive in construction and easy and effective in operation.

The invention is claimed as follows:

An exhaust nozzle provided with a stationary tip having guideways, and a movable tip therein provided with arms adapted to slide in said guideways and support and guide the movable tip, and means for engaging said arms to operate said tip.

An exhaust nozzle provided with a stationary tip having an interior wall inclined inward toward the top, and guideways, a movable tip therein having an interior wall inclined inward toward the top, and arms adapted to slide in said guideways and support and guide the movable tip, and means for raising and lowering said movable tip.

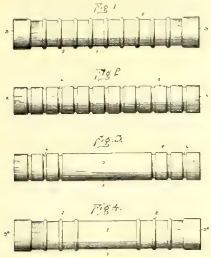
Boiler-Tube

No. 682,299.

JOHN W. WALSH, of Burlington, Iowa.

The invention relates to tubes designed for use as boiler tubes; and its primary object is to provide a boiler tube so constructed as to allow for expansion and contraction due to sudden changes in temperature.

A further object of the invention is to provide a corrugated tube which may be readily cleaned and in which the corrugations are so relatively arranged as to avoid the accumulation of scale between the corrugations.



It is designed to form the corrugated tubes from sheets of metal of the proper size and thickness, and in important characteristic of the improvement is that the parts of the metal plate to be corrugated are thickened or reinforced, so that the corrugated portion of the tube when the latter is completed will be of the same strength and thickness of metal as the uncorrugated portion of the tube.

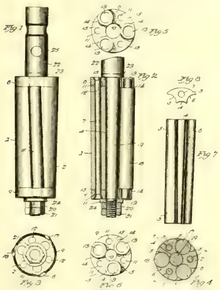
By employing the improved metal sheets, which are thickened or reinforced at the points where the corrugations are to be formed, I entirely avoid the objection to the employment of sheets of uniform thickness.

Tube-Expander

No. 683,291.

THOMAS R. JOHNSON, of Joplin, Missouri.

A tube-expander, comprising a plurality of longitudinal tapered segmental body-sections, which are assembled to form a tapered cylindrical body, each section having its inner face provided with a central longitudinal groove, and opposite longitudinal side grooves that extend to the outer edges of the section,



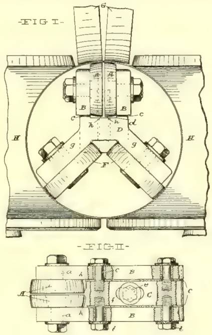
the registered central grooves forming a longitudinal bore for the body, and the registered side grooves forming roller-seats, the edges of the sections being separted to form open outer sides for the seats, opposite circular heads applied to the respective ends of the body, and each head having openings to correspond with the ends of the respective seats, with inner marginal flanges surrounding the said openings, whereby depressed seats are formed for the snug reception of the adjacent ends of the corresponding body-sections, the body-sections and the heads having seats, fastenings received in said openings, rollers mounted in the respective seats, and having terminal journals mounted in the flanged openings of the heads, and a mandrel rotatably mounted in the bore and in frictional engagement with the rollers, one end of the mandrel being projected to form an operating part.

Tube-Welding Machine

No. 681,694.

WILLIAM S. GORTON, of Cleveland, O.

In a tube-welding machine, the combination of two electric current conducting devices respectively connected with opposite electric poles and adapted to



have contact respectively with the opposite edge portions of the butt-joint of a tube, two rolls adapted to compress such tube between them and thereby force said joint edges together, mandrel means which provide bearing for said butt edge portions in resistance to the pressure of said contact devices, the extreme projection of said mandrel means located relatively to the direction of the tube movement before the extreme projection of said contact means toward said axial line, a mandrel frame, supporting means for said frame located in the axial plane of said compression rolls across the line of movement of the tube and adapted to bear upon such portion of the tube as may at any certain time be located in said plane, substantially as set forth.

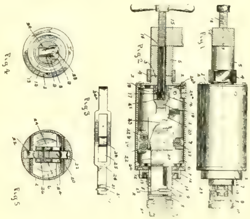
In a tube-welding machine, the combination of two electric current conducting devices respectively with the opposite edge portions of the butt-joint of a tube while free from contact with such joint, mandrel means adapted to provide bearing for said tube edge portions in resistance to the pressure of said conducting devices, a mandrel frame, supports for said frame adapted to bear upon the tube, said conducting devices, mandrel means, frame and supports being relatively located so that a plane substantially right angular to the line of movement of the tube may pass through them all.

Flue-Cutter

No. 682,864.

CARL WITTKE, of Columbus, Ohio.

The objects of the invention are to provide an improved rotary flue-cutting device by means of which a boiler-flue or similar body may be quickly and neatly severed, to provide improved cutter holding and operating mechanism, and to produce other improvements in details of construction. Rotary motion be-



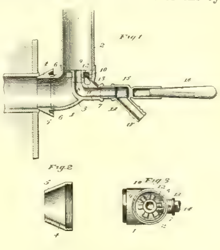
ing contributed to the hollow shaft 5, and hence to the cylinder 1 and the parts contained therein, the stem 14 is turned inward until through the forward movement thereby imparted to the blade 20 and the consequent elevating of the roller 26 and lever 24 the wheel cutter 28 is in proper cutting contact with the inner surface of the tube to be cut. A gradual continuous inward movement of the controlling-stem 14 serves to feed the cutter into the material forming the tube, resulting in the latter being readily severed.

Boiler-Flue Cleaner

No. 681,854.

WILLIAM H. HOWE, of Toledo, Ohio.

This invention relates to improvements in boiler-flue cleaners of the type



shown in letters patent No. 566,763, issued September 1, 1896.

In the operation of the device steam is admitted to the jet-nozzle from the hose and escaping into the discharge-pipe passes out through the same and the smoke-stack of the boiler-furnace such force and speed as to create a partial vacuum in the discharge-pipe around the jet-nozzle and the end of the flue. A suction is thus created which will draw all soot and other impurities from the flue into and up through the discharge-pipe. The shape of the elbow is such that the soot cannot collect therein, and the fan or wheel on the end of the jet-nozzle will by its rotation serve to break up the soot and create a current which will carry it out through the discharge pipe.

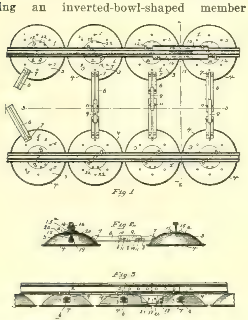
Railway Cross-Tie

No. 680,335.

JOHN LANZ, of Pittsburg, Pa.

A metallic railway cross-tie comprising two circular members provided with openings arranged diagonally to the line of the rail-base, clamps comprising a bar having hook-shaped ends projecting through said openings and adapted to engage the rail-base, said hook-shaped ends being held against the rail-base by the walls of the openings through which they pass, and detachable cross connections between said circular members.

A metallic railway cross-tie comprising an inverted-bowl-shaped member

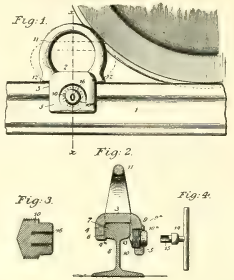


adapted to be embedded in the road-bed and to be rotated in place, said member having a flat top with openings arranged diagonally to the line of the rail-base, and hook-shaped clamps extending through said openings and adapted to engage the rail-base, said clamps being held against the rail-base by the walls of the openings through which they pass.

Device for Locking or Anchoring Railroad-Cars on Sidings

No. 680,034.

A device for locking cars on sidings, etc., comprising a body portion having a



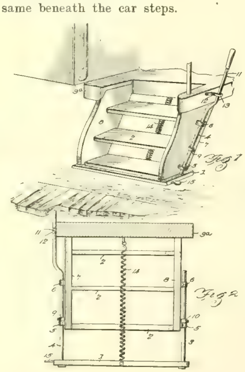
vertically-disposed ring or projection thereon, and side extensions adapted to fit over the rail, one of said side extensions being adapted to impinge one side of the rail, and the other of said side extensions being provided with a threaded opening, a threaded plug adapted to said opening, said plug having its inner end made conical so that its apex will fit under the lower surface of the tread portion of the rail, and the outer end of said plug being provided with a groove, and a key adapted to said groove whereby said plug is turned to fasten the body portion to the rail or release it therefrom.

Extension Car-Step

No. 684,278.

MILTON LYTCH, of Rowland, N. C., Assignor of one-fourth to WILLIAM L. TOWNSEND, of same place.

The combination with car steps, of an extension step provided with rods extending upward from it, one of the rods being extended to form an operating rod, guides mounted on the car steps and receiving the rods, a locking device for engaging one of the rods to hold the step in its extended position, and means for actuating the extension step to fold the same beneath the car steps.

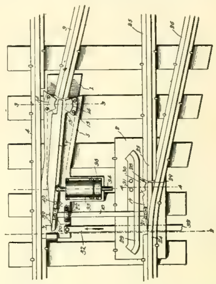


Railroad-Switch

No. 679,189.

HORACE SAGE, of Richland, Ind.

In a railroad switch, the combination with main rail 4 located at one side of the track, the main rail section located at the opposite side of the track, and the siding rails, of the pivoted points 7 and



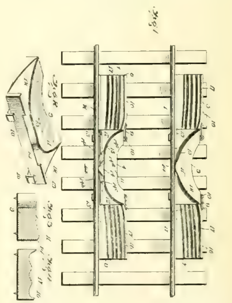
17, located at opposite sides of the track, the point 17 being located between the said main rail sections, the guard rail arranged at the inner side of the point 17, the transverse bar connecting the points, the oscillatory plate supporting and yieldingly connected with the points 7, and operating mechanism connected with the oscillatory plate, substantially as described.

Car-Replacer

No. 684,344.

JAMES BIRDWELL and WILLIAM O. VANCE, of New Albany, Ind.

The present invention relates to a novel car replacer, the object in view being to produce a simple and inexpen-



sive car replacing device or wrecking apparatus designed to effect the replacement of the derailed car upon the rails.

A further object of the invention is to provide as adjuncts for the wrecking frogs peculiarly constructed approach blocks having flexible connection with the frogs and designed to be placed at various angles for the purpose of facili-

tating the approach to the frogs of cars whose wheels are located at considerable distances from the tracks.

The improvement consists in a car replacing device comprising a locking frog having a replacing nose at its center and projecting beyond the edge thereof, said edge being vertically inclined, longitudinally and transversely inclined approach faces extending from the opposite ends of the frog to the replacing guards disposed along one longitudinal nose, vertical track flanges constituting guards disposed along one longitudinal edge of the frog at the ends thereof, and terminally pivoted switch points located at the inner ends of the track flanges and normally disposed against the face of the nose.

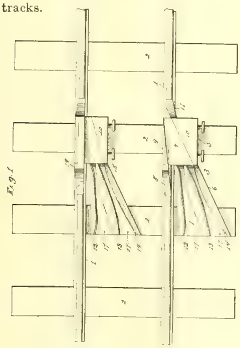
Wrecking-Frog

No. 681,349.

EZRA SMYTH, of Greencastle, Ind.

The invention relates to "wrecking frogs," and has for its object to provide a device of this class which is adapted to be used to replace cars upon the track after the same have by wreck or other cause been derailed.

A further object of my invention is to provide a wrecking frog which can be easily and quickly set up under a car and which does not require any digging or otherwise disturbing the road bed of the tracks.



A further object of my invention is to provide a wrecking frog which will under all circumstances and conditions be held securely and firmly in place and which will not yield and slide under the weight of the rolling stock.

A further object of my invention is to provide a wrecking frog which is so constructed that a car or engine which has not been derailed can safely pass over said frog without being derailed.

A further object of my invention is to provide a wrecking frog which is simple in its construction, positive in its action, and composed of a minimum number of parts.

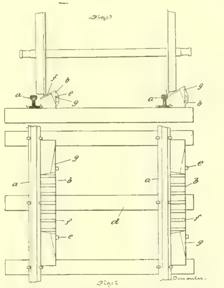
The invention consists in the combination of an outside wrecking frog, an inclined plane, a series of ribs secured thereon, a tapered inclined rib adapted to rest upon the top of the rail, an inside wrecking frog on inclined plane, a series of ribs secured thereon, a rib inclined at both ends adapted to rest on top of the rail parallel with said rail, and independent from said ribs on the inclined plane and considerably above the same, spurs on the under side of said frogs, a vertical wall engaging one side of the rail, a movable plate engaging the other side thereof, and means for adjusting said plate.

Replacing-Frog for Cars or Locomotives

No. 683,041.

JOHN F. HANIGAN, of Philadelphia, Pa.

Generally speaking, the invention relates to that class of portable frogs employed in replacing derailed cars, locomotives, and other similar rolling stock.



The principal object of the present invention is to perfect the existing type of frog.

A further object is to insure the frog against accidental displacement without the use of clamping devices.

A still further object is to provide means for more conveniently carrying and handling the frogs.

The device consists of an enlarged body portion cut away to accommodate a railroad tie or sleeper and adapted to span at least three or said ties or sleepers.

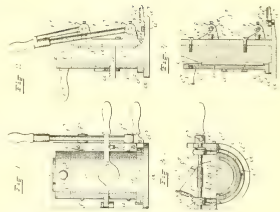
Mold for Casting Journal-Box Linings

No. 683,824.

FRED. M. WELD, of Attleboro, Mass.

Journal boxes are usually lined with Babbitt or other compound metal linings. It is desirable to cast these linings into the journal boxes so perfect and complete that little or no finishing is required.

The object of this invention is to facilitate the casting of the linings into the journal boxes; and to this end the



invention consists in the peculiar and novel construction and the combination of the parts whereby linings may be cast into the journal boxes complete with the required thickness of the projecting end flange, as will be more fully set forth hereinafter.

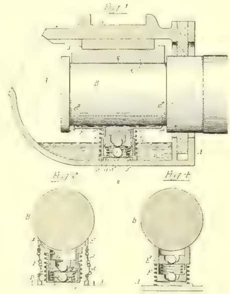
A mold for casting the linings into journal boxes having a base and back plate, a removable core secured to the back plate, means for securing a half of a journal box against the face of the back plate, and means for loosening the box after casting the lining comprising a plurality of shafts, a lever connected to the shafts for operating them, cams on the shafts, and posts extending through the back plate.

Lubricator

No. 681,848.

GEORGE F. GODLEY, of Philadelphia, Pa.

The combination of a box, a reservoir in the bottom of the box, a journal mounted above the reservoir, a bearing for said journal, a cylinder extending from the reservoir to the under side of the journal, and an independent pumping mechanism within the cylinder operated by the jar or other movement of the car.



The combination in a lubricator for car axle or other bearings, of a journal, a reservoir for the lubricant below the journal, a cylinder between the reservoir and the journal, a piston within the cylinder, a spring supporting said piston, and a valve for controlling the flow of the lubricant to the journal.

BOOKS REVIEWED.

THE USE OF THE SLIDE RULE.

By F. A. Halsey, The D. Van Nostrand Co., Publishers, 23 Murray Street, New York, 1901. Price 50c.

Why is a Kodak camera like a slide rule? Because both are operated on the principle—"you press the button and we do the rest!" In this little book of 84 pages, the reader is not only instructed how to press the button, but is told why the slide rule does the rest. The preface tells us that the book is mainly a reprint of articles which originally appeared in the *American Machinist*, the periodical of which Mr. Halsey is an associate editor.

The slide rule is a labor-saver. It is based upon the principle of logarithms, yet a knowledge of the theory of logarithms is not necessary for the use of the slide rule. The logarathim of a number is briefly the power to which 10 has to be raised to give that number. Using logarithms, when one wishes to multiply two numbers together, it is only necessary to look up the logarithm of each in the table, add the two logarithms together, and the sum, is the logarithm of the product required. The slide rule is divided into a number of spaces varying in length, but each corresponding to the logarthms of the digits; on the left, and to 10, 20, 30, etc., to 100, on the right. The first problem given in the book is the multiplication of 2 by 3. The procedure with the rule is to set 1 of the slide, below 2 of the body scale. Above 3 of the slide scale will be found 6 on the body scale, which is obviously correct. The explanation is that the distance from 1 to 2 on the body of the rule is really the logarithm of 2, and the distance from 1 to 3 on the slide is the logarithm of 3. The logarithms of 2 and 3 added, give the logarithm of 6, which is read direct from the scale on the body of the rule.

This simple example will suffice to show the principle upon which the action of the slide rule in this and other mathematical operations is based. The user employs natural numbers, which the slide rule, by its divisions, translates into logarithms, performs the mathematical part of the work, and gives the answer in natural numbers. The rule in effect says: "You set the slide and I do the rest." The book explains fully the principle of which only the merest hint is here given. It explains the theory of mechanical addition as exemplified by the slide rule. It deals with the multiplication of fixed numbers. That important operation, the finding the decimal point, division, multiplying vulgar fractions, the use of the "runner" on the slide rule, continued multiplication, the reducing of vulgar fractions to decimals, squares and square roots, areas of circles, slide rule formulas, gage points, the inverted slide, the circular slide rule, extended scale instruments, special slide rules, and some special forms of computers, are all touched on.

The illustrations, some eighteen in number, are on folded plates at the end of the book, so printed as, when open, to lie outside the edge of the printed page of reading matter, thus being always before the eye, no matter how many pages may be turned. This arrangement is one which the student will appreciate fully. With the aid of Mr. Halsey's book, the time-saving slide rule should be easily within the reach of those who desire to escape the drudgery of mathematics.

HAND BOOK OF PRACTICAL MECHANICS.

By Charles H. Saunders, Ph. B., Yale. D. Van Nostrand, New York, 1901. Price, $1.00.

The second edition of this useful little book of 227 pages has just been issued. The author says that in again placing it before the mechanics and engineers of the United States, he has endeavored to add such information as has been suggested from time to time, and yet to preserve the condensed form which commends it for constant use in the shop and drawing office, as well as for general practical instruction. The book opens with a comprehensive alphabetical table of the contents. A few brief explanations of the signs used in formulæ, etc., follows. Such rules as how to find the Bursting Pressure in Cylinders or pipes, and also the Safe Pressure for the same, are given in the opening pages. Formulas used in solving triangles, are quoted. Tables on the teeth of pinions, Some explanation of Logarithms, with tables; Tables of Natural Sines, etc., appear in the pages of this work. Under areas of plane figures are given the triangle, regular polygon and circle with tables concerning the latter. Then come, threads of screws with tables. Rules affecting pulleys, shafting, belting, etc., are to be found. Rules for computing horse power of engines. Lathe thread-cutting rules follow. The Metric system and its English equivalents are neatly tabulated. Wire gauges and their equivalents, and workshop receipts, together with numerous rules, tables, and general information on a great variety of subjects are found compressed within the covers of this little work.

It is a book which ought to be most useful to mechanics, draughtsmen, engineers and others who have computations to make and problems to solve. It contains information on a great variety of matters, and should make a handy book of reference as well for the shop as for the office. It is of convenient size, being 6 1-4 by 4 1-2 inches; not too bulky for the pocket, which is certainly a recommendation, though perhaps a minor consideration.

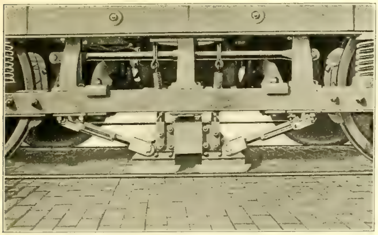
HANDBOOK ON STRUCTURAL STEEL

The fifth edition of the Cambria Steel Co.'s handbook of information relating to structural steel has just been issued. It is an exceedingly attractive looking book, bound in red morocco leather. It contains 428 pages, and in addition to its table of contents, has a comprehensive alphabetical index at the back. The sections of steel shapes, with the usual information concerning them, are to be found in the pages of this work, together with useful tables, rules, data and formulæ for the use of engineers, architects, builders and mechanics. This edition contains a large amount of new matter, including drawings of new sections of T-bars, special channels, and special angles, with tables of weights, dimensions and properties therefor. Drawings and tables relating to new standard connection angles for beams and channels giving location and other data for sections of different depths framing opposite each other; tables of safe loads for beam columns, latticed channel columns, plate and channel columns, plate girders and beam box-girders; also tables of dimensions of Z-bar columns, latticed channel columns and plate and channel columns. The general offices of this company are in Philadelphia, while the extensive steel plant is situated in Johnstown, Pa.

Electric Brake and Heater

The Westinghouse Air Brake Company is introducing a combined magnetic car braking and heating apparatus for use on trolly lines. It was designed and patented by Mr. F. C. Newell. The apparatus consists of a double track shoe, with brake heads and shoes, of ordinary type, which act directly on the wheels. The track shoes, which slide upon the rails, are attached to horseshoe electro-magnets suspended with legs downward immediately over the track rail. These shoes are normally held up, clear of the rails, by suspension springs. On exciting the magnet, it is drawn down and grips the rail. The current is supplied by the car motors acting as generators. The brake is, therefore, operated entirely independently of live current, and is fully available for use on down grades, when the live current is cut off. Failure of the line current has, of course, no effect on the brake action. "The magnet circuit is controlled from the ordinary car controller, the motion of the handle past the 'off' position throwing the brake magnet gradually into circuit by working over a series of resistance steps, the resistances being of such values that the brake operates on normal service with a gentle and gradual motion, or with an exceedingly rapid motion in cases of emergency."

When the brake is applied the track-shoes are strongly attracted to the rails, this is equivalent to an increase in the weight of the car. A retardation of motion is effected by reason of friction between track shoes and rails, and a maximum brake effort is produced on the wheels, through the effect of drag of the track shoes being transmitted to the brake shoes, by appropriate mechanism. The pressure on the brake-shoes is automatically regulated by the condition of the rail. If dry and sandy, the drag of the track shoes is more powerful, and this at a time when the wheels are least likely to slide. If the rail be slippery, the track-shoe friction is lighter, and the then easily slid wheel is acted upon by a proportionally diminished force. This is a most important feature, and



secures the highest possible breaking power at all times, without danger of "skidding" the wheels.

There is yet another automatic adjustment of breaking effect. The motion of a car, if rapidly retarded, throws on the forward wheels a somewhat greater proportion of the weight resting on the truck. By placing the fixed lower fulcrum of the forward brake-shoe lever, slightly above the pin connecting it with the telescope rod, a brake-shoe pressure is applied to the forward wheels proportionately greater than that acting upon the rear wheels. When the motion of the car is reversed, these conditions are also reversed with entirely satisfactory results.

An additional advantage is found by employing an improved form of rheostat, in the automatic control of speed down long and steep grades. This result is owing to the fact that a certain resistance in the rheostat insures a fixed current flow at a given speed; and this resistance can be readily adjusted so as to permit just enough current to pass through the track-shoe magnets to hold the car at the required speed, against the action of gravity, on any grade; any increase in speed increases the current and causes the brakes to act with greater force, while a decrease in speed instantly decreases the current and the brake action at the same time, so that the speed of a car may be automatically regulated within narrow limits regardless of changes in the gradient.

The apparatus can be used on trailer cars and the brake be operated from the motor car.

The fact that the use of this electro-magnetic brake, practically adds weight to the car at the moment the brake is applied, constitutes a unique and most valuable feature. The Westinghouse high-speed brake, applies, for a short period of time, a brake-shoe pressure, in excess of that required to slide the wheels; and the patent recently granted to Mr. W. H. Sauvage, of Denver, (*Digest*, August, 1901, p. 323) aims at making additional car weight, due to load, automatically increase the air pressure—both of these are ingenious methods, designed to secure maximum brake power under changed or changing conditions. In neither of these methods, can the varying state of the rail be dealt with. With the electro-magnetic brake mechanism, that most troublesome feature is not only allowed for, but is utilized with a degree of perfection, which leaves little to be desired.

THE HEATER.

The car heaters are connected with the general system of wiring by means of a suitably arranged switch, so constructed that the braking and starting currents, both of which are used for heating the car in cold weather, may be divided as desired and the whole or any portion thereof sent through the heaters, the remainder going through the proper portion of the diverter beneath the car. Whatever portion of the total actual current is flowing through the heaters flows through every section alike, which results in heating the car uniformly, no matter how small the amount of heat required. The ordinary electric car heaters, in which the heat is generated by line current, have so small a storage capacity that they are cooled to atmospheric temperature very quickly when, for any reason, the current is interrupted. An important advantage of this heater is its great capacity to store and retain heat within its mass. In the event of blockades or of the failure of line current from any cause, this heat storage capacity is so great that the car is kept comfortable for an hour or more, even in severe weather.

PERSONALITIES

Thomas W. Flannagan has been appointed storekeeper of the Minneapolis, St. Paul & Sault Ste. Marie Railway, vice Mr. O. W. Applegate, deceased.

W. L. Harrison, formerly superintendent of shops of the St. Louis & South Western R. R. at Pine Bluff, Ark., has been appointed superintendent of locomotive and car shop of the Central R. R. of New Jersey at Elizabeth, N. J., vice R. O. Cumback, resigned.

C. A. De Haven has been appointed superintendent of motive power of the Shreveport & Red River Valley R. R., with headquarters at Shreveport, La., to succeed Mr. W. R. Howden.

A. A. Mayer has been appointed master mechanic, in charge of the Montreal shops of the Grand Trunk, to succeed Mr. J. E. Muhlfeld, resigned.

A. M. Waitt, superintendent of motive power and rolling stock of the New York Central & Hudson River R. R., sailed for Europe this week and will be absent for one month.

T. G. Shaughnessy, president of the Canadian Pacific Railway, has been made a Knight Bachelor of the Order of St. Michael and St. George by King Edward VII.

J. J. Scully, heretofore assistant to the master mechanic of the Canadian Pacific at Toronto Junction, has been transferred to Winnipeg, in the same capacity.

L. R. Johnston, who has heretofore been superintendent engineer at Vancouver, of the Canadian Pacific, in charge of the Vancouver shops and of the company's steamers, has been appointed assistant superintendent of rolling stock, with office at Montreal.

T. A. Summerskill, master mechanic of the Northern Division of the Grand Trunk, has been appointed superintendent of motive on the Central Vermont, vice William Hassman, resigned.

George B. Williams has been appointed assistant to the master mechanic of the Canadian Pacific at Toronto Junction, Ont., to succeed Mr. Scully, transferred.

Mord Roberts has resigned as general master mechanic of the Louisville & Nashville to accept the position of superintendent of motive power and machinery of the Kansas City Southern, with headquarters at Kansas City, Mo., to succeed Mr. F. Mertscheimer.

W. W. Atterbury, superintendent of motive power of the Pennsylvania Railroad, has been appointed general superintendent of motive power of that system, with headquarters at Altoona, Pa., to succeed Mr. F. D. Casanave, resigned.

M. J. Collins has been appointed assistant general purchasing agent of the Atchison, Topeka & Santa Fe system, with offices at Chicago, Ill.

D. J. Durrell, mechanical engineer of the Pennsylvania lines, at Columbus, O., has been appointed assistant engineer of motive power of the Southwestern system.

W. C. Dallas has been appointed assistant superintendent of the locomotive and car department of the Missouri-Pacific system, with headquarters at St. Louis, Mo.

J. H. Watters, master mechanic of the Louisville & Nashville at Anniston, Ala., has resigned to accept the position of master mechanic of the Georgia Railroad, at Augusta, Ga.

Thomas Tipton, formerly purchasing agent of the Rio Grande Western, has been appointed assistant purchasing agent of the Denver & Rio Grande, with headquarters at Denver, Colo.

J. N. Barr, for the last few years superintendent of motive power of the Baltimore & Ohio, has been appointed superintendent of machinery of the Erie, in place of Mr. A. E. Mitchell.

A. E. Mitchell, mechanical superintendent of the Erie Railroad, and one of the best-known motive power officials in the railroad field to-day, has resigned after 15 years of service with that road. Since 1886 he has held the positions of engineer of signals, engineer of tests, mechanical engineer and superintendent of motive power of the Erie Railroad.

Record of New Equipment

Ordered during the Month of October, 1901

CARS

Ordered by	No.	Class.	Built by
C., B. & Q..........	800	Box.	Pullman Co.
C., B. & Q..........	1,000	Coal.	Ill. Car & Equip. Co.
Chic. Junc..........	100	Gondola.	Haskell & Barker.
Chic., Mil. & St. P...	4	Sleepers.	Pullman Co.
C. & N. W..........	4	Dining.	Ill. Car & Equip. Co.
C. & N. W..........	2	Parlor.	Ill. Car & Equip. Co.
C. & N. W..........	4	Baggage.	Ill. Car & Equip. Co.
C. & N. W..........	44	Mail.	Ill. Car & Equip. Co.
C. & N. W..........	3	Coaches.	Ill. Car & Equip. Co.
Cold Blast Trans. Co.	100	Refrig.	Am. C. & F. Co.
Colo. Sps. & Crip. Cr.	100	Box.	Am. C. & F. Co.
Colo. & South.......	100	Box.	Am. C. & F. Co.
Cudahy Packing Co..	10	Tank.	Am. C. & F. Co.
Cumberland & Penn..	5	Freight.	So. Bald. C. Wks.
Gr. Bay & Western...	75	Freight.	Pullman Co.
Illinois Central......	1,000	Coal.	Am. C. & F. Co.
Illinois Central......	500	Freight.	Haskell & Barker.
Kentusky Refining Co.	5	Com.	Am. C. & F. Co.
L. S. & Mich. South..	1,500	Box.	Haskell & Barker.
Lehigh Valleyy......	2	Box.	Am. C. & F. Co.
Minn. & St. L.......	1	Comb.	Pullman Co.
Minn. & St. L.......	2	Chair.	Pullman Co.
Mo. Pac............	24	Box.	Am. C. & F. Co.
Mo. Pac............	18	Box Bodies.	Am. C. & F. Co.
Mo. Pac............	1	Furniture.	Am. C. & F. Co.
Mo. Pac............	2	Box Bodies.	Am. C. & F. Co.
Mo. Pac............	1	Stock.	Am. C. & F. Co.
Mo. Pac............	2	S'tk Bodies.	Am. C. & F. Co.
Mo. Pac............	6	Coal.	Am. C. & F. Co.
Newaygo P. C. Co...	4	Ore.	Am. C. & F. Co.
Pere Marquette......	12	Comb.	Am. C. & F. Co.
Pitts. & L. E........	1,000	Coal.	Pressed Steel C. Co.
P. S. & N...........	200	Coal.	Erie Car Works.
St. Chas. Refrig. Desp	100	Refrig.	Am. C. & F. Co.
St. L., K. C. & Colo..	1	Private.	Am. C. & F. Co.
St. L. & San Fran...	500	Coal.	Am. C. & F. Co.
Seattle & North.....	20	Coal.	Am. C. & F. Co.
Swift & Co.........	100	Rrefrig.	Am. C. & F. Co.
Vandalia	200	Coal.	Am. C. & F. Co.
Wau. Tank Line.....	5	Comb.	Am. C. & F. Co.

LOCOMOTIVES

Ordered by	No.	Class.	Built by
Alg. Cent. & H. B....	20	Locos.	Can. Loco. Wks.
Atch., Top. & S. F..	2	Locos.	Am. Loco. Co.
C., B. & O..........	6	Atlantic.	Bald. Loco. Wks.
Cin., Rich. & Muncie..	6	10-wheel.	Bald. Loco. Wks.
Colo. & Wyo........	3	Locos.	Bald. Loco. Wks.
Dominion Steel Co...	20	Locos.	Can. Loco. Wks.
D., S. S. & Atl......	4	Locos.	Rogers Loco Wks.
Gr. Rap. & Ind......	7	10-wheel.	Am. Loco. Co.
G. N. of Canada.....	2	Mogul.	Bald. Loco. Wks.
Intercolonial	20	Locos.	Can. Loco. Wks.
Michigan Central.....	20	Locos.	Am. Loco. Co.
M., St. P. & S. Ste. M.	1,000	10-wheel.	Am. Loco. Co.
Miss. Pac...........	65	Locos.	Am. Loco. Co.
Pere Marquette......	10	10-wheel.	Am. Loco. Co.
Queen & Crescent....	3	Locos.	Am. Loco. Co.
Seaboard Air Line...	20	Locos.	Am. Loco. Co.
Vandalia	5	Switcher.	Bald. Loco. Wks.
Vandalia	10	Locos.	Am. Loco. Co.

OBITUARY

Henry O. Bradley, the last surviving member of the firm of Osgood, Bradley & Sons, car builders in Worcester, Mass., died Tuesday night of pneumonia. He was the youngest son of Osgood Bradley, who built the first car in the United States and founded the car manufactory which bore his name. He was seventy-three years old.

Supply Trade Notes

Mr. J. L. Mallory, of the Chicago Grain Door Company, has just recovered from a two months' siege of typhoid fever.

Protectus paint, manufactured by the Protectus Company of Philadelphia, has been specified on 1,100 steel cars for the Philadelphia & Reading Railroad, now being built by the Pressed Steel Car Company, Pittsburg, Pa., and on 500 steel cars for the same company, now being built by the Cambria Steel Company at Johnstown, Pa.

The directors of the Safety Car, Heating and Lighting Company have declared the usual quarterly dividend of 2 per cent and an extra dividend of 3 per cent. A stock dividend of 10 per cent has also been declared out of treasury stock. The cash dividends are payable October 1, and the stock distribution September 1.

The Continuous Rail Joint Company of America has a complete outfit of special machinery that enables it to roll the continuous rail joint to fit perfectly any T or girder rail section used by steam or street railways. Ninety-two different rail sections are used by the one hundred and twenty-five railroads having this rail joint in successful operation. The address of the Continuous Rail Joint Company of America is 142 Market street, Newark, N. J. Circulars and full information will be sent on application.

In spite of the fact that large additions have been recently made to the plant of the Sargent Company at Chicago Heights, it has again been found necessary to extend them. This time it is the pattern shop which is found inadequate, owing to the large increase in the volume of business.

The fifty thousand mark has been passed by the Pressed Steel Car Company in the manufacture of pressed steel cars. This company's output of cars up to the 24th of October aggregates 50,091, enough to make a train of steel equipment over three hundred miles long.

At a meeting of directors of the Pressed Steel Car Company, held in New York on Wednesday, the 23d of October, the usual quarterly dividends were declared of one and three-quarters per cent on the preferred stock, and one per cent on the common stock.

At the annual meeting of the Car Foremen's Association of Chicago, held October 9th, the following officers were elected for the ensuing year: President, J. C. Grieb; vice-president, O. M. Stimson; secretary, Aaron Kline; treasurer, LeGrand Parish. The address of Secretary Kline is changed to 886 S. Turner avenue.

At the Traveling Engineers' Convention the Michigan Lubricator Company exhibited a large lubricator and also called attention to their automatic driver brake retainer.

The railway department of the International Correspondence Schools had a good display of lesson papers at the Traveling Engineers' Convention, and were well represented by W. N. Mitchell, Ed. M. Sawyer, C. B. Conger, J. F. Cosgrove, H. Flynn, John Bodman, and others.

The Pullman Company has just finished and delivered to the Louisville & Nashville Railroad Company three elegant dining cars, equipped with the "axle light" system of the Consolidated Railway Electric Lighting and Equipment Company. No auxiliary light has been provided in the cars. One of these cars will run between Cincinnati and Louisville and two between Birmingham and New Orleans.

The Messrs. Keuffel & Esser Co., manufacturers and importers of drawing materials, mathematical and surveying instruments, has received the only gold medal awarded at the Pan-American Exhibition, for excellence in this particular line.

"HERE AND THERE IN OUR SHOPS."

This is the title of a little pamphlet which the Brown & Sharp Manufacturing Company distributed at the Pan-American Exhibition. It is devoted entirely to views of the different parts of its various shops, and contains a brief history of the growth of the plant in Providence, R. I., together with a description of some of the methods of manufacturing which this firm employs. A room full of Universal milling machines is shown, a view of the grinding department is given, followed by automatic gear cutting machines, plain milling machines, automatic screw machines and measuring machines. The pamphlet is well printed and has much interesting information between its covers.

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GEORGE S. HODGINS, Editor

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The Per Diem System vs. Mileage, and Quiet Enjoyment

If A owns a house and rents it to B, he does so for a definite space of time, and he expects to receive a definite sum of money therefor. In the legal document, called a lease, A may be termed the lessor and B the lessee. B may be willing to repair, he may agree not to carry on any business detrimental to the property, and finally, in strictly legal phrase, "the said lessee covenants with the said lessor, for quiet enjoyment." The sum and substance of the bargain, however, is that if B takes the house for a given time he has to pay for it in proportion. A does not bother himself to see whether B lives in the house all the time or not. In that matter B pleases himself. A provides the house, draws the lease and collects the rent.

Applying the mileage system of car rental, as now in vogue to the contract just outlined, we would find A providing the house as before, and fixing the rental, not for a specific time, but for the period only which B would be willing to acknowledge as that in which he had used the house. If B said he had lived there two days in the month, that would be the full extent of time for which A could expect to receive revenue. If B said he had not used it at all, A would have no rent and no resource against B at law. This is not an exaggerated picture of the case. The first instance roughly simulates the Per Diem system and good business, while the latter approximates to the mileage system and "quiet enjoyment," as applied to cars.

Pushing the analogy still further in view of the tendency to make owners of cars repair many defects, which is clearly indicated in the M. C. B. code of interchange rules, we would find A covenanting to repair, and B simply upholding his right to "quiet enjoyment" to the full extent of the law, because the owner could not ascertain the extent of the use, and casually mentioning the amount of his own indebtedness from time to time.

The Committee on Per Diem, formed by the Eastern Association of Car Service Officers, says with truth that "the mileage plan is a breeder of idleness, that idle equipment creates a false demand for more, and that unnecessary equipment is a waste of capital." The Per Diem system, operating in a broad and liberal spirit, will counteract these defects; it will furnish an efficient check on car earnings, and it will be an incentive to prompt return of cars. In fact, so tempting does the Per Diem system appear, that the committee is hard put to it, to find a satisfactory reason why it has not long ago been adopted.

Another aspect of the case which has not been touched on by the committee, is the part Per Diem would play in car maintenance. As it is now, owners are broadly responsible for and are actually made to pay for defects due to wear and tear and failure under fair usage. The rates to be charged in such cases are prescribed in the interchange rules, and the figures are generally regarded as fair; but, nevertheless, any owning company would, if given the chance, prefer to make the repairs to its own cars rather than pay for them on presentation of a defect card. Some years ago the western roads proposed that as labor and material were higher with them than on eastern roads, they should be authorized under the rules to add a certain percentage to the prescribed charges for repairs to foreign cars when chargeable to owners. The alteration was, however, not made in the rules.

The bearing which the Per Diem system would have on such cases would be to a certain extent indirect, but with the prompt return of cars the bulk of the wear and tear and failure under fair usage would of necessity take place upon the lines of the owning company, and the wear and tear owing to the "quiet enjoyment" of some one else's property due to idle equipment, or as unreported mileage, would be automatically reduced to a minimum.

Cars belonging to the Push & Pull Railway, if lying miles from home in the yards of the Borrower & No Hurry Company, though technically idle, have to stand a certain amount of very decided wear and tear in the constant switching to which they may often be subjected, or to something, resembling in a real, though not technical sense, very unfair usage, if employed as bumping posts in long sidings while waiting for the uncertain tide of traffic to flow again conveniently over the "home route." Concerning unreported mileage, we have nothing to say except that it is flat dishonesty.

Per Diem would effectually destroy unreported mileage; it would silently, but rapidly, concentrate the bulk of the wear and tear and usage both fair and unfair in owners' yards and on owners' tracks by bringing cars promptly home. It would give each company a larger percentage of its own repairs to do, with reduced foreign repairs to make. It would thus bring about less carding for defects and generally facilitate interchange business, for which the car inspector would be devoutly thankful; and it would at the same time exercise a very satisfactory influence on the company's balance sheet into the bargain. It would also sound the death knell of the "quiet enjoyment" idea.

First Aid to the Injured

EDITORS RAILROAD DIGEST:

In the November number of your valued journal, in speaking of the syllabus of instruction in First Aid to the Injured prepared for the International Association of Railway Surgeons, you say, page 434, "The only thing that appears to us to be wanting in the admirable course outlined above is definite instruction as to what should be done with persons struck by lightning or stricken with dynamic electricity in any form. There is abundant proof that persons so inured are not always dead, and information as to how to treat them cannot be too widely known."

As secretary of the Committee on First Aid of the International Association of Railway Surgeons, which drew up the syllabus, and as the one on whom the greater share of the work devolved, permit me to thank you for your kind reference to the result of the labors of our committee, and to assure you that the "only thing wanting" will be found after all in our syllabus.

Under the headings of *Fourth Lecture*, you will note "First Aid to the unconscious; the immediate treatment of those apparently drowned *or otherwise suffocated or disabled*, etc." Lightning stroke and electric shock come under this head, as do also suffocation by gases, smoke, steam pressure and many other accidents which, while not specifically mentioned in the syllabus, are yet included and receive due consideration in the manual of instruction, "First Aid in Accidents," based upon this syllabus and prepared for and endorsed by the association at its last meeting, and which will be the basis of instruction by lecturer, as well as a book of reference for the pupil in the classes which will be held.

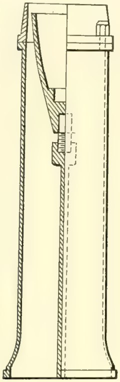
The manual, I am assured by the publishers, Messrs. Flemming H. Revell Co., Chicago, will shortly appear.

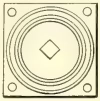
CHARLES R. DICKSON.

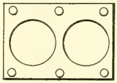
Toronto, Canada.

A New Exhaust Pipe

EDITORS: I noticed in the November number of RAILROAD DIGEST a new exhaust pipe, invented by Mr. J. R. Barnes, S. M. P., Wabash Railway. As a matter of fact, in 1889 we were experimenting with the "Smith vacuum exhaust pipe." At that time I made a pipe like that shown on the inclosed blue print, and it was used from three to six months in engines running suburban trains. The object was to deaden the sound of the exhaust, which it certainly did. One could not tell the difference between it and a "Smith." There were other troubles con-







nected with it which no doubt Mr. Barnes will learn in good time. While our engines steamed well, there was no saving in fuel, but the lessening of noise was accomplished. After a while the pipes were all taken out. I did not consider the idea worth patenting, though no doubt I could have secured a patent at that time.

So it goes, every now and then, some old abandoned invention crops out and is patented. If you see fit you can use this for correcting the claim of original invention.

WILLIAM H. TAFT,
S. M. P., B. & A. R. R.

Allston, Mass.

Per Diem and a Differential?

The Busy & Not Rich Railroad Company does not own many cars, but it enjoys the patronage of a large saw mill company at one of its stations. The saw mill business is worth looking after, and the freight has to be hauled perhaps over less than half the length of the B. & N. R. Railroad. The cars are delivered to a trunk line, which in turn hands them over to two connections in varying quantities. By hypothesis the company originating the business is more or less constantly short of cars, and it gets cars for the saw mill business from the trunk line. A certain number of cars have to be kept on hand all the time at the mill, as the use of them is sure, though differing in number from day to day in accordance with the shipments from the mill. The B. & N. R. Co. is, therefore, a "borrower" in the full sense of the word, should it be made to pay per diem charges without mercy for the business originates on its road? The trunk line gets the "long haul," and two connections do a certain amount of business in the matter. There is more in it for the trunk line than there is for the others, so it supplies the cars, as the B. & N. B. cannot, its cars being used elsewhere, as the road is busy. Should the B. & N. R. road pay per diem charges for trunk line cars which come down and are held on the mill siding perhaps several days awaiting load? It borrows the cars, but it originates the business that none of the others could possibly get alone. How would a "differential" work in per diem charges where circumstances obviously alter cases?

Violent Air-Compressor Explosion

A singular accident, which occurred a short time ago at a silver mine in the West, illustrated applied thermodynamics in an interesting, but fatal, manner. Prof. Thurston lately told the readers of Science the circumstances of the case. It appears that the cylinder of an air compressor exploded, while in operation in regular work, and with a violence that gave evidence of more than the action of the normal air pressure in its production. The back cylinder-head and the cylinder itself were shattered, the violence of the explosion having been terrific. Two men were thrown across the room, one was instantly killed and the other severely injured. The air pressure at delivery from the compressor was 80 lbs. per sq. in. The cause of the explosion is presumed to have been the compression of the vapors of petroleum given off by oil used for lubrication in too large quantity, and of too light a quality. Mingled with air in the right proportion for combustion, the mixture of air and vapor, by the thermodynamic action of compression rose to the temperature of ignition and explosion followed. This action is precisely that relied upon in one of the more recently developed types of oil motor for the ignition of its charge, independently of gas torch or electric spark. The phenomenon has long been known to the engineering profession, although instances of this kind of accidents are rare. The use of effective methods of cooling the compressor cylinder and the employment of lubricating oils of high flashing point constitute the preventatives.—*Cassier's Magazine.*

Perpetual Motion

At the annual meeting of the American Association of Inventors and Manufacturers, Mr. Francis H. Richards read a paper on "Perpetual Motion," from which we extract the following: Observing that nature utilizes every atom of matter and force, and perceiving that every loss of force in one direction is compensated for in some other direction, the seeker for perpetual motion, not misled, but led not far enough, finds seeming confirmation in natural laws for his hopeless attempt, and sees, not altogether incorrectly, even in the doctrine of conservation of forces, proof of the final realization of his search. The error consists not so much in assuming the possibility of the perpetual motion as in failing to recognize that this consummation already exists. Nature, which always says "Follow me," and whose lamp illumines the entire course of creation from the atom to the infinity, lighting the pathway of all human achievement, points unmistakably both to the possibility and the fact. The perpetual motion which the inventor has sought is not a myth, but is real. But that complete compensation of forces of which he has dreamed, is found only at the limit of possibility, at infinity. There can be, as there is, only one perpetually self moving mechanism, and this is—the Universe.—*Iron Age.*

[That the late Prof. Huxley did not believe perpetual motion possible of achievement by man, is clear from the fact that he classed certain men who held that fossils are only freaks of nature, along with what he called "perpetual-motioners" and "flat-earth men." The United States Patent Office will not now entertain any claim for a perpetual motion machine.—EDS. RAILROAD DIGEST.]

The Railway Race in England

The railway race run this summer over the three railway routes from London to Edinburgh resulted in a victory for the East Coast Companies.

The East Coast line consists of the Great Northern, the North-Eastern, and the North British Railways. The distance measured over this route is about 395 miles. The run is made through Grantham, York, Durham, and Berwick in 7 hours and 45 minutes. The Midland distance is about 404 miles, and runs through Leicester, Leeds, Settle, and Carlisle, from which point the North British Railway takes the train to Edinburgh. The schedule time at present is 8 hours and 35 minutes. The West Coast Line consists of the London and Northwestern Railway as far as Carlisle, and the Caledonian Railway to Edinburgh. The distance is about 400 miles and the time 8 hours. Trains on this line run via Rugby, Crewe, and Carlisle.

Locomotive Classification

By John W. Converse.

In the manufacturing and mechanical world everything moves along the line of least resistance. That which is nearest to hand and easiest answers well enough. A thing is good enough until something better is found. There are a great many kinds and types of locomotives, but not only is there no general practice of representing the variations in types by symbolic notation, but not even is there a uniform system of nomenclature, "Four-wheel Switcher," "American" type, "Mogul" and "Consolidation" are generally accepted terms, but the type of locomotive with two pairs of driving wheels, a four-wheeled front truck and a pair of carrying wheels back of the drivers, is variously called "Atlantic," "Central Atlantic," "Chautauqua," and "Northwestern." A locomotive having three pairs of driving wheels, a pony truck front and a pair of trailing wheels back, is named both "Prairie" type and "Lake Shore" type by different roads and builders. This ambiguity in describing locomotives is ample proof of the fact that there is a field for the graphical representation of locomotives, and that a system of symbolic notation, showing clearly the type, is a convenience and an advantage both for the train and tonnage sheet of the railroad, in the drawing room and office, and in the shop practice of the builder.

Roughly speaking, there are four general methods of classifying locomotives prevalent among the leading railroads of this country. For convenience we will call these the nomenclature, the numerical, the dimensional and the alphabetical systems. The first of these is really no system of classification at all; it merely calls different types of locomotives by their accepted names, as "Mogul," "Consolidation," "Ten-wheel," "American." The difficulty in classifying exclusively by this system is that new names have to be coined when we get beyond the basal types; besides, variations within the class, difference in weight, diameter of cylinders, etc., are not indicated. About fifteen per cent. of our leading roads use this system to designate the different types of locomotives which they operate.

By the numerical system, we mean arbitrarily assigning a certain block of numbers to a certain type of locomotive. For example, the Union Pacific Railroad Company's practice is to set aside blocks of numbers, the first locomotive of each type being assigned the first number of the block, and an engine is known as belonging to a class called by the initial number of that class: e.g., ten-wheel engines of a certain design are numbered from 600 to 699, and known as the "600" class. This method, of course, does not convey much as to the type to the uninitiated. It serves, however, to impress the stockholders with the size and activity of the motive power department.

Very few roads confine themselves to the dimensional system alone to classify their engines. By the dimensional system, we mean picking out one dimension of a locomotive—the total weight, the diameter of the cylinders, or of the driving wheels, and assigning to the class this number. For example, the Denver & Rio Grande call an engine weighing 180,000 pounds a "Class 180." The impracticability of this system where there is a diversity of types is obvious.

About sixty per cent. of the leading railroads of the country use an alphabetical system to classify the different types of locomotives operated. There is great variety in the way this is applied; some differentiating by size of cylinders, some by number of driving wheels, and some by total number of wheels. The predominating practice is to assign different letters to a varying number and arrangement of truck and driving wheels, and then by numerical or small letter affixes, to indicate variations in size, detail or design within the class. The Pennsylvania Railroad uses primary letters to designate the type, numbers to designate the different classes of any type, and small suffix letters to designate modifications of any particular class of locomotives. In this classification the locomotives are grouped into typical classes, according to the number of wheels used under them. Letters from A to H are used—A, representing a four-wheel switcher, and H, a consolidation locomotive, the largest type operated. Future modifications of any existing classes will be designated by small suffix letters, while entirely new classes of any particular type will be indicated by the proper primary letters and numerals. F-3-b represents a Mogul locomotive with cylinders 20-in.x28-in. driving wheels 62-in. in diameter, weighing 162,000 pounds and with a wide firebox over the driving wheels. The small suffix "b" indicates this last modification. The original practice of the Pennsylvania Railroad was to have a narrow firebox between the frames.

Systems of this kind approach nearly to a true classification. They are, of course, perfectly plain and simple to the motive power department and amply adapted to the needs of the road. But, viewing the matter purely from a theoretical standpoint, a system of this character is illogical because it is essentially arbitrary—a proof of which, is the fact that even the motive power department itself, of a road using such a system, has to use a chart or key, by which to explain it.

The Lehigh Valley Railroad and the Central Railroad of New Jersey use a combination of the "Dimensional" and the "Alphabetical" systems. Both use a numeral to indicate the total number of wheels under an engine and a capital letter to designate the number of driving wheels; the former company sub-divides the class by indicating the diameter of the cylinders and the inside diameter of the driving wheels; the latter differentiates by a fraction, the numerator of which, indicates the total weight of the engine and the denominator, the weight on the driving wheels. These systems are both simple and logical.

Locomotive manufacturers, either do not classify at all, carrying the work through by a construction number, or if they do use a method of notation, it is necessarily more elaborate than one used by a railroad. The only locomotive builders who use a classification by symbols are the Cooke Company, H. K. Porter & Company, the Brooks Locomotive Works and the Baldwin Locomotive Works. Other manufacturers simply employ the conventional terms, Ten-wheel engine, Mogul, Consolidation, etc., and the work is carried through the various shops by a consecutive construction member. A time card of the Schenectady Locomotive Works, for instance, would read, "Engine No. 25,071, 10-wheel," or "Engine No. 35,-042, compound consolidation."

The Brooks Works affix the cylinder diameter to an arbitrary letter or combination of letters, which indicates the number and arrangement of driving wheels. Suffixes are also used to designate an additional rear truck or trailers and the type of water tank employed when a separate tender is not used.

The Cooke Works use the initial letter of the name of the type and affix a number to indicate a variation in the drawing.

The H. K. Porter & Company's classification is as follows: The number of driving wheels is expressed by the letters:

A for two driving wheels; B for four driving wheels; C for six driving wheels; D for eight driving wheels.

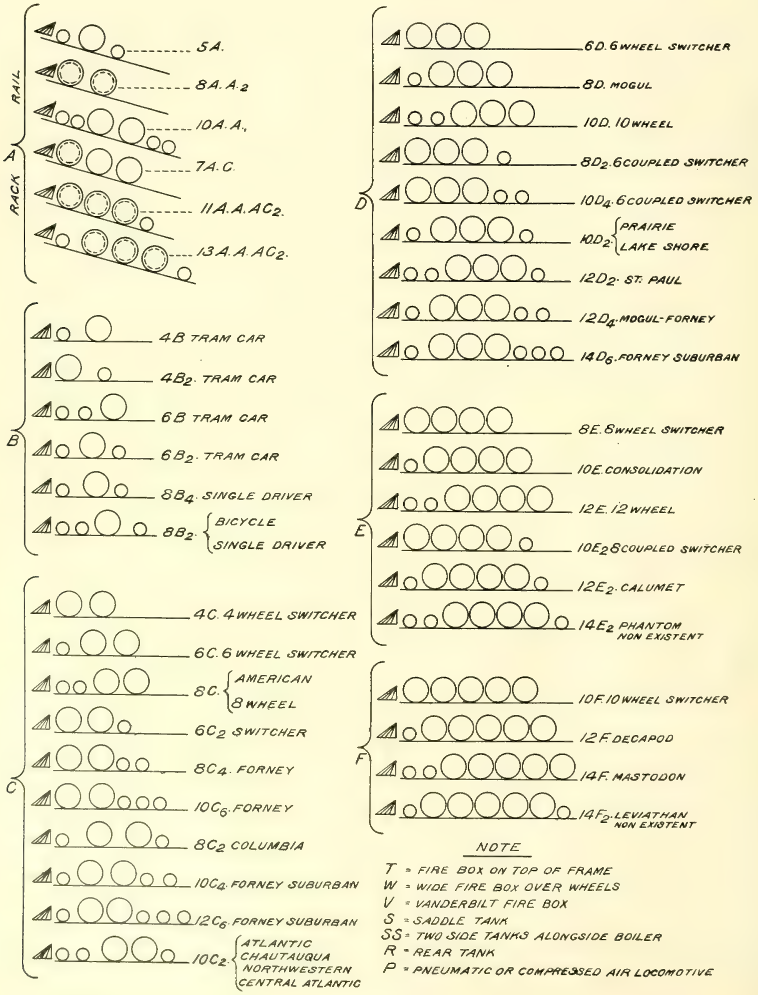
The number and position of truck wheels are expressed by a figure 2 for two-wheel or figure 4 for a four-wheel truck; for a rear truck this figure is placed to the left, and for a front truck it is placed to the right of the letter denoting the number of driving wheels, and separated from the letter by a hyphen. (The locomotive is supposed to be headed toward the observer's right hand). Thus, 2-B denotes a locomotive with a two-wheeled rear truck and four driving wheels; 4-C-2 a locomotive with a four-wheeled rear truck, six driving wheels and a two-wheeled front truck. The arrangement for water is denoted by: T for tender tank with eight wheels; T4 for tender tank with four wheels; T6 for tender tank with six wheels; S for saddle; SS for two side tanks alongside of boiler; R for rear tank; RR for two tanks one each side at rear. Other letters are used to denote style of cab, etc.

The designation of the different classes of locomotives, as used by the Baldwin Locomotive Works, embodies the combination of certain figures with one of the letters A, B, C, D, E, or F, to indicate both the number and kind of wheels and size of cylinder; thus a locomotive having one pair of driving wheels is classed B; that with two pairs, C; that with three pairs, D; that with four pairs, E; and that with five pairs, F. The letter A is used for a special class of high speed locomotives, with a single pair of driving wheels, and to designate a type used for rack-rail service. A figure (4, 6, 8, 10 or 12) is used as an initial figure to indicate the total number of wheels under the locomotive. A figure or figures following the initial figure, indicates the diameter of the cylinders, and the figure or figures following the class designation, represents the consecutive class number of the locomotive on which it appears. Thus, 8-26-C 500 indicates a locomotive

with eight wheels in all, having cylinders 16 inches in diameter, with two pairs of driving wheels, and that it is the five hundredth locomotive of its class.

The number representing the cylinder diameter is an arbitrary figure, originally intended to represent the weight of the locomotive in tons, but in present practice it has no such reference, 40 representing a 23-in. cylinder, 38 a 22-in. cylinder, 36 a 21-in. cylinder, and so on. The size of the cylinder may be found by dividing this number by two, and adding three to the quotient, or the figures for cylinder in the class designation may be obtained by subtracting three from the number indicating the diameter of the cylinder in inches, and multiplying the remainder by two.

The same rule is carried out in the classification of compound locomotives. In this case, however, a number is given to indicate the diameter of each cylinder, that indicating the high pressure being written over the low pressure. Thus, 10-22/42 D 100 indicates a compound locomotive with ten wheels in all, having high pressure cylinders 14-in. in diameter and low pressure cylinders 24-in. in diameter, with three pairs of driving wheels; and that it is the one-hundredth locomotive of its class.



Similarly the system serves to represent electric locomotives, except, that instead of the arbitrary number designating the cylinder diameter, a fraction is used, the numerator of which indicates the number of motors and the denominator, the horse power.

The addition of the fraction $\frac{1}{4}$ to any class indicates that there is a truck placed at each end of the locomotive. The addition of the fraction $\frac{1}{3}$ to any class indicates that there is no front truck, but that a rear truck is placed back of the firebox.

The method of designating the number of driving wheels by letter was first used in 1842, and has been continued without change since that time. For forty years a system in which a figure representing the total weight of engine in tons, combined with a letter representing the number of wheels connected as driving wheels was used to designate the class. Thus, 30 C meant a 30-ton engine with two pairs of driving wheels, 32 D, a 32-ton engine with three pairs of driving wheels. This coincidence was noticed; the diameter of the cylinders in inches, was always half the total weight of the engine in tons plus three; i.e., a 30 C engine would have 18-in. cylinders, a 32 D would have 19-in. cylinders, and so on. In 1882 the system of classification was altered to include the total number of wheels under the engine and the diameter of the cylinders. To avoid altering records and drawings too much, this coincidence was taken advantage of, to indicate the diameter of cylinders under the new system, though the ratio, which was, of course, merely a chance one, soon no longer continued to hold good.

The figure representing the total number of wheels under the engine was placed in front of this arbitrary figure, thus adding these two new dimensions to the classification and entailing comparatively little alteration of drawings and type records.

We have seen that there is a field of usefulness and convenience, for a scheme of locomotive symbolic notation and have glanced at a few of the systems in vogue among the leading railroads and builders of the country. What, then, we may ask, constitutes a good system of classification, one that is at the same time simple and comprehensive? What we require must differentiate distinctly and positively between types and must not be too arbitrary.

Locomotives, according to the power used, fall naturally into three groups: steam, pneumatic, and electric locomotives. As the steam locomotive is the most predominent and important group, we will base our system of classification on it. The elements which serve to differentiate types of steam locomotives are as follows: (1) the number and position of driving and truck wheels; (2) size and kind of cylinders, whether single expansion or compound; diameter of cylinders and length of stroke; (3) the diameter of driving wheels; (4) the weight of engine; (5) the type of firebox; (6) the position of the water tank. All other varying features are incidental. A theoretically perfect classification, should embody all these elements, but practically this would be cumbersome, hence some must be eliminated. The diameter of the driving wheels, being an uncertain factor, may be dispensed with. Otherwise it must always be understood whether the inside or outside diameter is taken. The piston stroke, and the weight of the engine, are not important factors for classification. They are largely governed by other elements, and may be omitted. This leaves for consideration, the number and position of the wheels under the engine; the diameter of cylinders; the type of firebox; and the position of the tank. We may indicate the total number of wheels under the engine by a numeral, and the number of driving wheels by capital letters, beginning with A. Let A, indicate a locomotive with a single driving wheel, i.e., a rackrail locomotive with one rack and pinion wheel; B, one pair of drivers; C, two pairs of drivers; D, three pairs, and so on. A small numeral, written at the bottom and to the right of the primary letter, indicates the number of trailing or truck wheels back of the drivers. A simple process of arithmetic, then, shows the number of wheels in the front truck. Let us write the diameter of the cylinders between the number indicating the wheel total and the letter indicating the number of driving wheels. If the cylinders are single expansion, the fact will be indicated by the number being an integer; if compound, by the number being a fraction, the diameter of the high pressure cylinder being the numerator.

Let us take as the ordinary type of firebox a narrow one inside the frames, and indicate variations from this position by the letters T, signifying narrow firebox on top of frame; W, indicating wide firebox over wheels; and V, indicating Vanderbilt cylindrical firebox.

Let us consider a tender tank as the primitive type, and denote variations by the letters S, for saddle tank; SS for side tanks alongside the boiler, and R for rear tank.

The locomotive is now considered as headed towards the left. The total number of wheels is read first, then the cylinder diameter, then the letter denoting the number of driving wheels, and the small numeral indicating the number of trailing wheels, if there are any; next, if these variations occur, the letter or letters defining the position of the firebox or tank; and lastly, the construction number; or, if a railroad, the operating number in the class. This number may be preceded by the number sign (§). To illustrate our meaning: a rack locomotive, with two pairs of carrying wheels, one rack and pinion wheel, cylinders 18-in. in diameter, and a rear tank would be indicated 5-18-A R § 5. Where there is more than one rack wheel, or where there are both rack and adhesion wheels, we can represent it by repeating the letter A, indicating a rack wheel, or, by adding the letter which indicates the number of driving wheels coupled together. This must be done in order to maintain a consistent system.

A locomotive with one pair of driving wheels, a four-wheel front truck, two rear carrying wheels, compound cylinders 15 and 24 inches in diameter and a Wootten fire box, would be indicated thus, 8-15-24 B_2 W. An eight-wheel locomotive with a four-wheel front truck, two pairs of driving wheels, cylinders 19 inches in diameter and two side tanks would be written, 8-19 C SS. A single expansion ten-wheel engine would be represented 10-22 D, and a compound consolidation, 10-15-25 E.

A suffix letter P, may be used to designate a pneumatic or compressed air locomotive, and the number and arrangement of wheels and diameter of cylinders may be indicated as in the steam locomotive instance.

There being no cylinders in an electric locomotive, we may use, to take the place of this dimension, in differentiating, a fraction, the numerator of which, indicates the number of motors and the denominator the horse power. The same system of numerals and letters denotes the number and position of wheels.

A locomotive built at the Baldwin Works for the San Domingo Improvement Company, of San Domingo, West Indies, presents a rather knotty problem in classification. It was built to run by both adhesion and rack rail. It has two pairs of adhesion driving wheels, a two-wheel front truck, and on this front truck axle is the rack and pinion wheel, which can be thrown into use when desired. The adhesion driving wheels are connected with a set of compound cylinders and the rack wheel, with single expansion cylinders. The adhesion and rack wheels are independent of each other and can be made to operate separately or together, at will. The locomotive is equipped with two side tanks alongside the boiler. To be consistent with our system we must designate this engine, 7-11 $\frac{8}{13}$ AC SS.

An instance like the above, is, however, the limiting case, the exception which proves the rule.

Just as in chemistry when proceeding from inorganic to organic, a consistent symbolic representation becomes somewhat cumbersome, the system should not be condemned on that account.

In describing the foregoing system we may have been arbitrary, in assigning letters to indicate the number of driving wheels. But, as the sequence of letters is arranged on a simple and logical plan, and as the introduction of an additional numeral, in place of the letter, to indicate the number of driving wheels, would tend to confusion, the alphabetical system seems preferable. It has been the writer's endeavor to base this system upon ideas of simplicity, compactness, consistency and elasticity.

The Digest: A Monthly Synopsis of Universal Railroad Literature

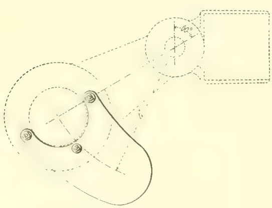
Maintenance of Way, Bridges and Buildings

Shield for Signal Lights

Railroad Gazette, Nov. 1, 1901, p. 756.

One of the evidences of defective maintenance frequently seen in the signal department of a railroad is a drooping semaphore; an arm which has been pulled, supposedly, to the *all clear* position, hanging only about 20 or 25 deg. down from the horizontal position.

To properly discipline the inspectors who should keep all signals correctly adjusted, the superintendent needs the cooperation of the locomotive runners, and, as a means of securing this, signals in a number of places have been made with elongated colored glasses, so that, at least in the night, a signal which is not pulled down to the required angle will continue to show an indication against approaching trains and thus provoke the engineman to complain. Many signals on the Pennsylvania road, and some signals on other roads, have for several years been fitted with glasses, red for stop signals and green for distant signals, which, instead of being circular are



Shield for Signal Light.

made approximately oblong; lengthened on the line of the circle in which the center of a round spectacle moves when the position of the arm is changed. This, at night, prevents the display of a clear signal unless the signal wires are properly adjusted to put the semaphore in the prescribed position for all-clear, usually 60 deg. or more downward from the horizontal. In a more recent design two circular glasses of the same color have been used in the place of the single oblong glass.

A still simpler method is to use a plain sheet-iron shield, by which the signal light will be entirely obscured, except when the arm is in one of its two correct positions. This is the device used by Mr. Grafton, Signal Engineer of the Pennsylvania Lines West of Pittsburg. The shield is made of No. 18 sheet-iron and painted black. It is fastened to the spectacle casting by three 1-4-in. bolts. For three-position signals, which are used on the Pennsylvania Lines, Mr. Grafton has a shield of slightly different shape. This shield has the advantage of costing less than any of the other expedients mentioned, 15 cents a signal covering the entire expense.

Signal Colors

Railway and Locomotive Engineering, Nov., 1901, p. 484.

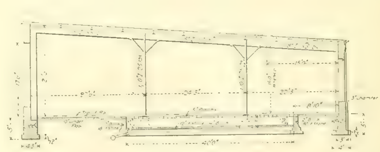
The officials of the Pennsylvania are discussing the question of the most suitable colors for signals, and it may be that they will finally decide to abandon the white light. With white as an all-clear or safety indication, accidents are liable to happen in case the green or red glass is broken. On one or two occasions when the red or green glass was purposely destroyed bad wrecks have occurred.

The Pennsylvania officials are inclined to take green as the all-clear signal, but we should recommend that before coming to a decision, a committee make a visit to the New York, New Haven & Hartford lines in Boston and see with what success they are operating a yellow light as an indication of safety. The white light is the very worst thing that could be used, especially in these days where so many white lights of all kinds of intensity are to be seen in the line of vision on which an engineer has to look for station signals. We believe that the Consolidated roads of Massachusetts are moving in the right direction with yard signals and their experience ought to be useful to others.

Fireproof Roundhouses on the Canadian Pacific Ry.

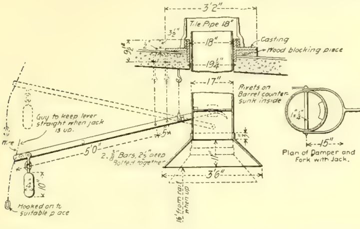
American Engineer and Railroad Journal, Nov., 1901, p. 352.

By courtesy of Mr. Tait, Manager of Transportation, and Mr. Peterson, Chief Engineer of the Canadian Pacific, the drawings of their new fireproof construction for roundhouses have been received by the *Am. Engineer*. There is no wood about the building except the 5-in. plank floor at the pits and the mouldings at the edges of the roof; it is therefore really fireproof. This particular house has eight stalls, but the same



construction would apply to larger ones. The foundations are of stone and the pits may be of either stone or brick. If of stone the pits walls are 18 ins. and if of brick 12 ins. Either brick or stone may be used also for the outer walls.

Large sections of rolled shapes are used for the posts and roof beams, and upon these the roof of Roebling fireproofing is laid and covered with four-ply tar and gravel roofing. In the detail drawings the construction is clearly shown. It will be noticed that the roof members resting on the 18-in. I-beams are 7-in. I-beams at the turntable end of each section of the building and increased to 12 ins. at the outside where the span is longer. Tile pipe is used for the top portions of the smoke jacks, the lower portions, which are telescopic and movable being of riveted sheets mounted on counterbalanced levers with three locations of the fulcrums to accommodate different lifts.



A damper is placed near the bottom of the movable portion and the arm attached to the spindle engages with the roof casting or a bracket suitably placed on the roof. Except at the pits the floor is of cinders 10 ins. deep. The pits are 40 ft. long and extend to within 8 ft. of the outer wall.

New Tunnel at Gallitzin

Railroad Gazette, Nov. 15, 1901, p. 787.

The Pennsylvania Railroad Company is advertising for bids on a new tunnel to be built through the Allegheny Mountains at Gallitzin. This is to be 3,600 ft. long, parallel with the existing tunnel (of the same length) and 80 ft. south of it. The contract will also include 1,200 ft. of approach at the west end. This new single-track tunnel is designed for westbound trains, thus relieving the existing tunnel. The diagram of the relative position of the track now, and as proposed, appears herewith. The bids will be opened Monday, November 25, and plans and specifications may be seen at the office of the Chief Engineer, Mr. William H. Brown, at Philadelphia; also in the office of the Assistant Engineer, Mr. John F. Murphy, at Summer Hill, Pa.

No doubt a good many of our readers have seen, in the newspapers, a story about the project to build a tunnel seven miles long through the Alleghenies to get rid of the Horse Shoe curve and grade. The story was so improbable on its face that we never asked any of the Pennsylvania officers about it; but we notice that it has been denied by Mr. Brown in a newspaper interview. The origin of this newspaper tunnel is now disclosed. Doubtless some correspondent at Altoona heard of the new westbound tunnel to be built at Gallitzin, which grew in his imagination to a great tunnel which should get rid of the Horse Shoe curve.

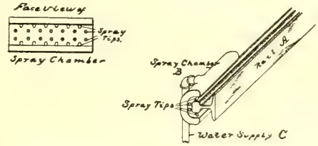
New Process of Treating Steel Rails

Iron and Trade Review, Nov. 21, 1901, p. 24.

The present process of rolling rails is to heat an ingot to a high temperature and then run it through breaking-down rolls, giving it about four passes, from thence it is passed to the finishing rolls. The method is at once straightforward and cheap, but the porous structure of the finished rail is a matter of serious consequence in respect to wearing qualities. This condition arises from the rolling of the rail at a very high temperature and then allowing the metal to cool undisturbed. Another disturbing factor is introduced from the unequal cooling between the two halves of the rail; the head being so much heavier than the thin web that irregular and weakening strains are impressed upon the material.

A recent invention is intended to avoid the troubles mentioned and increase the effective life of the rails by decreasing the porosity and grain of the material, lessening the initial strains and removing the scale. The new process is the invention of William E. Coyan, of Homestead, Pa.

In carrying out the process a heated ingot is taken from the breaking-down rolls and passed through the first set of grooves on the lower finishing rolls. The partially finished rail A is then passed back through the first set of grooves on the upper finishing rolls and water or oil is then applied by a spray or jet from the hollow chamber B, fed by the supply pipe C, against the head of the rail. The application of water or oil partially chills the head and loosens the scale, and the stored heat will then run quickly out to the face and draw the temper. The still unfinished rail is then repassed through the second set of grooves in the lower finishing rolls, reducing the area and breaking off the scale. During this pass the oil or other cooling medium is again applied and the temper is subsequently drawn by the heat running out to the tread of the rail as in the previous case. The rail is subjected to a like operation in the second set of grooves on the upper rolls and finally a pass is made through the third set of grooves on the lower rolls and the head of the rail cooled more severely than before, after which the rail is carried away and left to cool. Mention is made of water and oil for cooling, but it is obvious that any other medium could be employed which would enable one to quickly cool the face below the temperature of the web for the alternate cooling and drawing of the temper between the passes through the rolls; in this connection compressed air might be mentioned as giving some of the advantages resulting from the use of water, oil or brine.



NEW PROCESS OF TREATING STEEL RAILS

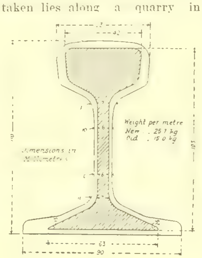
The inventor sums up the advantages of his process as follows: The scale is removed from the rail and the working of it into the face is prevented. The head is alternately cooled, heated, and reduced, which give all the beneficial results of reheating and working the steel as well as decreasing the temperature at which it is worked and finished. The temperature of the head of the rail is decreased and strains prevented during the final process of cooling. The process is equally applicable to girders having light webs and heavy heads or flanged parts.

Corrosion of Steel Rails by Sea Water in Tropical Countries

Railway Engineer (London), Nov., 1901, p. 325.

Mr. J. W. Post, engineer divisional chief of Netherland State Ry., says: In the late Mr. Bricka's paper on steel rails, it is stated that the destructive action of sea water on steel rails is only obvious in the case of tracks being in the immediate neighborhood of sea water, especially in tropical countries. There were no other definite data concerning this point related to this congress.

Referring to Mr. Bricka's remark, Mr. Dalprat, chief engineer of the Sumatra State Railways, sent me a curious document, and a piece of a rail which during 10 years has been exposed more or less to sea water. The track from which this rail has been taken lies along a quarry in Port Emma



(Sumatra) not much above ordinary high tide. A side-track is placed on a breakwater and its rails show the same phenomena of rust. The figure shows the section of the rail when new and also after 10 years, the rust-layer being removed; the table shows the diminution in dimensions and in weight.

As the width of flange had decreased by more than an inch, the fastenings no more fixed the rail. The inertia-moment of the rusted rail-section does not suffice to resist to the maximum wheel-charge of 5 to 6 tons, which the new rail carries easily.

These tracks have not been used for several years. In a track exposed to regular traffic the oxydation of the rails might have been somewhat less.

The decrease of weight is about 1 kilogram per meter for 1 year, or about 4 *per cent. of the weight* when new. This confirms the impression obtained by Mr. Bricka.

It therefore seems advisable, especially for tropical railways and tramways, to use *heavy rails with thick flanges* for such tracks which are exposed now and then to the direct action of sea water, as has been done long since in most countries for the tracks in long tunnels. It might perhaps pay to paint such rails with minium of lead, or such like.

Locomotive Equipment, Appliances and Related Matters

Why Greater Hauling Powers?

The Engineer (London), Nov. 15, 1901, p. 510.

The Engineer remarks editorially on the discussion which has been kept up in its columns on the relative merits of British and American locomotives. The statement that the American engine can haul much heavier loads than the English engine of the same general dimensions is the topic discussed. It says that this statement is constantly made with much assurance, but is seldom backed up with a reason. When a reason is supplied it is almost invariably wrong. The pulling power of a locomotive can be calculated by Pambour's rule—multiply the square of the diameter of one cylinder by the length of stroke in inches, and by the average cylinder pressure in pounds, divide by the diameter of the driving wheel in inches; the quotient is the tractive effort at the rails. This rule applies alike to British and American engines and to those of the rest of the world, without exception. This tractive effort at the rails is not the draw-bar pull, which will be less by the amount of frictional resistance and the rolling resistance of the engine and tender regarded as vehicles. To this must be added the effect of gravity, if the train is running up hill. As concerns engine friction, seeing that the workmanship and alignment of the British locomotive are better than those of the American engine, it seems that the machinery friction of the first cannot be in excess of the last; so we may dismiss that as a factor in the discussion. Concerning the resistance of the vehicle, it is alleged that the American being, so to speak, looses; it accommodates itself to bad road better than the British engine does. The British engine is fitted with a bogie; its side frames ought to be more flexible than the bar frame of the American engine, Compensating levers are freely used in both engines. "In point of fact," says the *Engineer*, "we strongly suspect that the argument is rather unsound. * * * It only remains for us to say in the words of Scotch juries, 'Not Proven.' "

If the "frictional" explanation is put aside, nothing is left to explain the greater hauling power but the greater average cylinder pressure. The safety valve loads are about the same for each engine. The normal British lap on a slide valve is 1 in., with no inside lap. The American engine has a lap of ¾-in. outside, and usually a negative lap, of say ⅛ in. inside. The result is that, on the whole, a cylinder diagram from an American engine can be made fatter than one from a British engine can possibly be. The *Engineer* thinks this is the reason why the American engines in England pull so well. Reduction of lap means increased consumption of steam. The American engine can pull, but it is in no sense an economical engine, either in fuel or lubricants.

Locomotive Draught Appliances

American Engineer and Railroad Journal, Nov., 1901, p. 335.

In connection with the *American Engineer* tests, Mr. H. H. Vaughan says:

An examination of the Hanover or Von Troske experiments discloses that they were directed almost exclusively to ascertaining the efficiency of various forms and sizes of stacks when used with nozzles of different sizes at varying distances from the stack.

In the experiments of the Master Mechanics' Association, on the other hand, only three stacks were used, and in most of the tests but one size of nozzle. The most advantageous position of this nozzle with reference to the stack was fully determined and the results obtained were confirmed for other sizes of nozzles. A number of tests were devoted to the details of the exhaust pipe; height of bridge, size of choke and form of nozzle and in these respects the results are practically final. The double nozzle, petticoat pipes, bridges in nozzles, and form of the steam jet were also experimented on, but not so completely as the other mentioned points.

In general then the two series of experiments have obtained results more or less definite as follows:

Hanover.	Three stacks with constant nozzles at varying distance.
Varying stack with varying nozzles at varying distances, constant pressure.	Effect of nozzle bridge.
Effect of nozzle bridge.	Form of jet, etc.
Form of jet.	Action of jet.
Effect of variation of pressure.	Detail design of exhaust pipe.
Master Mechanics' Association.	Double nozzles.
	Petticoat Fipe.

It is safe to assume that as far as the Master Mechanics' experiments go they are absolutely reliable, if they are not we might as well stop at once, but for several reasons that have previously been mentioned the same cannot be said of the Hanover tests.

It is unfortunate, in many respects, that the two series of experiments are to a large extent supplemental. Work done in Hanover was only in a few instances repeated at Chicago, and even in these instances the similarity is not complete. Had the Master Mechanics' experiments been conducted with a steady jet in place of on a running engine it would have been possible to compare the vacuum obtained on the assumption that it varies as the pressure in the exhaust pipe, allowing for the area through which air could flow to the front end, but as this was not done the only comparison possible is that of the general forms of the curves obtained.

Exhaust and Draught in Locomotives

Bulletin International R'y Congress, Nov., 1901, p. 178.

This is the report of the discussion and conclusions of question xi, "Means adopted to increase the production of steam by increased draught, to avoid fires caused by cinders from the chimney, to utilize the heat of the exhaust steam."

CONCLUSION.

1. No general rule to decide on the choice between a fixed and variable blast can be laid down. This choice should take into account whether the locomotive does uniform or irregular work, the profile of the lines run over, the loads drawn, the length of run between stops, the kind of fuel used, the cost of maintenance of the apparatus, and the care and skill of the staff.

2. The simple circular fixed blast and the variable blast fitted with two flap valves appear to satisfy most of the requirements met with in practice.

3. More complicated arrangements, such as the blast fitted with petticoat above it, the deflector plate placed in the smoke-box, the annular blast either fixed or variable of the variable blast with sliding sleeve, bye-pass for a portion of the steam, etc., may give good results, but do not as a rule appear to show any great superiority over the two simple forms mentioned above, provided that the latter are suitably arranged. Blast pipes are subject to rapid incrustation with dirt, which makes the maintenance of complex mechanism difficult; this incrustation is frequently unequal in the case of annular blasts.

4. The dimensions of the blast pipe and of the chimney and also the position of the blast pipe may be determined by certain formulæ, but it is advisable to verify the results by actual experiments on each case of locomotive; practical tests alone form the real criterion.

5. When the blast opens into the upper portion of the smoke-box, as is generally the case throughout Europe, it appears advisable not to raise the opening much above the upper row of tubes. When the blast opening is in the lower portion of the smoke-box it should be fitted with a petticoat. It does not appear that this arrangement, which moreover possesses some disadvantages, shows any great superiority over others. It is of great importance to provide a large and easy entry for the gases into the lower end of the chimney. There is a general tendency to somewhat increase the opening by making the upper portion of the chimney conical.

The length of smoke-box may attain and even exceed 2 metres (6 ft. 6¾ in.) without producing an unfavorable effect on the draught. Large smoke-boxes may serve as a receptacle for cinders; the chimney should then be placed sufficiently far back; but it is advisable, when no deflector plate is used, to place the chimney sufficiently far from the tube plate to ensure equal distribution of the gases throughout the tubes. When it is not desired to catch the cinders in the smoke-box, the length may be reduced to about 1.50 metre (4 ft. 11 in.) in accordance with recent American practice.

7. Spark arresting devices are rarely very efficient without impeding the draught. It is therefore advisable to use these appliances as little as possible, and to simplify them to as great an extent as the quality of the fuel and the character of the country run through may permit.

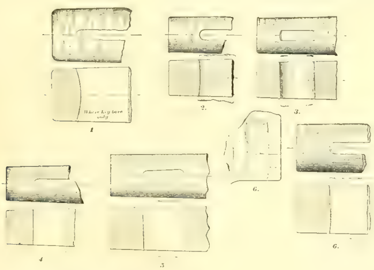
8. Of all apparatus intended to utilize the waste heat of the exhaust steam the injector is the only one which is found frequently in use; this apparatus appears to ensure some small economy in fuel, and to result in easier steaming.

Broken Piston Rods

Railway and Locomotive Engineering, Nov., 1901, p. 468.

In connection with the illustrations of broken piston rods, Mr. W. E. Symons, superintendent of motive power of the Plant System of Railways, writes as follows:

"I send you herewith a blueprint showing some specimens of broken piston rods. Comment is unnecessary. I recently had quite an epidemic of broken rods on the system, they be-



ing confined largely to about two divisions. In each case the master mechanic in charge complained that material furnished for piston rods was defective in quality. Tests made of the samples of these broken rods, however, developed a tensile strength of 47,000 to 50,000 pounds per square inch. The method of fitting them up in the shop, I think, discloses clearly the cause of failure."

Flanges or Blind Tires

Railroad Gazette, Nov. 15, 1901, p. 787.

At the October meeting of the Rocky Mountain Railway Club the question of blind tires again came up. In the course of the discussion the following letter from F. W. Johnstone, recently Superintendent of Motive Power and Machinery, Mexican Central, was read:

"We are running consolidation engines on our mountain grade of 3 per cent., with 24-deg. curves and 75-lb. rails; guard rails on all curves exceeding 17 deg. These locomotives have all the drivers flanged; 15-ft. driving wheel base, 23 ft. 5 in. total wheel base of engines, 160,000 lbs. on the drivers. These engines pass the curves freely, and the flange wear on the front drivers is very much reduced, as the second pair of drivers takes a part of it. Before we commenced to flange all of the drivers we had trouble with the blind drivers getting off the track, when the engines slipped violently in climbing grades. Although these blind drivers were 6½ in. wide, when the engine began to slip she would crowd herself sideways until the blind drivers got off the track. With all of the drivers flanged this cannot occur. And for the past two years we have flanged everything on the road—consolidation engines, 10-wheelers and moguls. To assist these consolidations in curving easily we allow a lateral play between inside of the hub and driving boxes, as follows:

Front pair of drivers, ⅛ in. on each side.
Second pair of drivers, 1-16 in. on each side.
Third pair of drivers, 1-16 in. on each side.
Fourth or rear pair of drivers, ¼ in. on each side.

The side rod brasses have lateral play on the pins as follows:

Front pin, 1-16 in.
Second and third pins, 1-32 in.
Fourth or back pin, ⅛ in.

These engines haul 250 gross tons back of the engine up these 3 per cent. grades and around these curves varying from 15 deg. to 24 deg., with only one tangent in 30 miles, which is as long as an eight-car train; and we get about 30,000 miles out of these engines between the turning of tires. In fact, the flanges do not get sharp any sooner than the tread of the tire wears down to our limit of ¼ in. in depth."

American Locomotives in Bavaria

Consular Reports, Nov. 25, 1901, p. 1.

The Berlin *Neuste Nachrichten*, of October 29, contains a telegram from Munich concerning the results of the experience of the Royal Railway Administration with American locomotives, of which the following is a translation:

The general administration of the Bavarian State railways ordered and received from the Baldwin Locomotive Works, in Philadelphia, two express passenger locomotives, which have been in use nearly three-fourths of a year. The difference between these locomotives—which are easily recognized by their unearthly whistle—and the German engines consists principally in the fact that they have on each side three cylinders, placed vertically one above the other, and cast in one piece with the valve chests and saddle. In other respects, the American machines are characterized throughout by the greatest simplicity in all parts, and their management differs very slightly from that of any other locomotive.

Since they were placed in service, the methods in which the steam power acts and the general efficiency of the locomotives have been very carefully observed. The result of all these tests and observations has been entirely satisfactory. The general direction has now, as is announced by the Munich *Allgemeine Zeitung*, secured the patent of the American Vauclain, and authorized the construction of a locomotive according to this system, with certain modifications, by each of the two firms Krauss & Co., of Munich, and J. A. Maffei, of Hirschau. These machines are now in process of construction, and it will depend upon their efficiency and durability whether the system shall be further utilized. The cost of the Bavarian locomotives will be about $5,760 greater than that of the American.

American Locomotives in France

Consular Reports, Nov. 26, 1901, p. 1.

A great deal of interest has been manifested in France in the experiments of the Paris, Lyons, and Mediterranean Railway Company in importing a number of American locomotives. The first delivery was made in March, since which time the locomotives have been in process of erection in the company's shops at Arles. After these machines had been erected, the controlling forces of the roadmaster's department objected to their use, because of the fact that the weight was unevenly distributed over the various sets of wheels. It was thereupon concluded to make such changes

in the mechanism as would evenly distribute the weight to the satisfaction of the roadmasters. This has now been done, and the machines are in partial commission. While they are thus, indeed, American locomotives, it does not appear that they are absolutely of the type commonly manufactured in the United States. My informant tells me that in the preliminary runs, these locomotives maintained a speed of 71.45 miles per hour.

A local newspaper supplies additional details as follows:

"Yesterday morning for the first time the rapid express No. 7 was conveyed from Avignon to Marseilles by one of the new American locomotives erected at Arles. This machine, No. 2999, was attached to a train of four large cars of the first class, weighing 34 tons, and two baggage cars, the total weight being 181 tons. The mining engineers charged with the control of this matter have been making recently, in connection with other principal agents of the company, numerous experiments with these machines between Miramas and Arles. The rates of speed attained have exceeded at certain moments 77.67 and 80.77 miles per hour upon this portion of the track, which, by reason of its favorable condition, lends itself better than any other to these interesting and important experiments, the results of which from the point of view of regularity of speed and general stability of these new engines, have been most satisfactory."

American vs. British Locomotives in India

Consular Reports, Nov. 8, 1901, p. 1.

Consul-General Patterson writes from Calcutta in answer to inquiries of the various railway companies in India regarding the comparative original cost of American and English locomotives, and the comparative working capacity and expense of running them, I have received the inclosed letter from the agent and chief engineer of the Bengal Central Railway, which may interest our manufacturers of locomotives:

To the Agent and Chief Engineer,

Bengal Central Railway, Calcutta.

Sir: With reference to your indorsement covering copy of a letter dated August 16 from the consul-general of the United States of America regarding the comparative working capacity and the cost of running, etc., of English and American locomotives, I have the honor to state as follows:

2. Five American engines were received and started to work in July and August, 1899. At the commencement of their career, the engines did not steam freely, and the fuel consumption was also very high—almost 70 pounds per mile. This was, however, remedied by the introduction of the following alterations, viz.: (1) One single-exhaust pipe and blast nozzle (in place of double pipe and nozzle); (2) all deflecting plates removed from smoke box; (3) new fire grate bearing bars to take 22 fire bars in place of 24; (4) new regulator valve of the State railway type in place of single double-face valve; (5) india rubber feed pipes in place of brass castings ball and socket; (6) lubricators for pistons. Their performances at the present time are equal to the engines sent out by Dubs & Co. and Nasmyth Wilson & Co. The fuel consumption has also been brought down to 40.5 pounds per mile.

3. The cost of American compared with British engines is as follows:

Description.	Cost.	
Americans with steel fire boxes and steel tubes, delivered in 75 days	£2,120	$10,317
Americans with copper fire boxes and brass tubes, delivered in 75 days	2,427	11,811
Neilson & Reid's bogie, delivered in 12 months	3,060	14,801
Dubs & Co.'s bogie, delivered in 17 months	3,000	14,560
Sharp Stewart's bogie, delivered in 21 months	2,985	14,527

4. The fuel consumption is as low as that of the British engines, after being altered here by me. The American engines have run 118,440 miles since August, 1899, and no duplicates have yet been used, except the turning up of the bogie wheels of one of them. They are all, however, showing a tendency to have sharp flanges.

5. The engines pull well and run much easier than the British locomotives.

6. Since they were put to the lines, no repairs excepting the ordinary trifling ones were done. One has, however, been sent to the shops lately for somewhat heavy repairs, on account of its sustaining damage in a collision.

7. Since forwarding the above report of the American engines in November, 1900, these engines have been running heavier trains during the first half year of 1901, owing to the stoppage of all "goods trains." With these heavier loads, the American engines do not show so well in consumption of fuel as the English engines by nearly 3 1-2 pounds per mile. The consumption of oil is also heavier—almost 1 pound per 100 miles run.

American Competition in Locomotives for India

Engineering, (London), Nov. 8, 1901, p. 653.

Some time ago Lord George Hamilton, Secretary of State for India, wrote a letter on the question of purchasing engines for India, outside of Great Britain. In reply to this, three leading firms of locomotive builders in England and Scotland wrote a joint letter to the London *Times*. In commenting editorially on this letter, *Engineering* thinks that the public would infer from its general tone, that American engines are not only cheaper but inferior to British-built engines. In the matter of neat appearance and external finish superiority is conceded to the British machine. One of the important statements in the *Times*' letter is that "When the American builders began to compete, they were allowed to offer their own type of engine, except in the case of some details which did not affect the general construction." This *Engineering* points out is entirely incorrect. The joint letter says that British firms were asked to build to British types only, but that the foreign locomotives that have been supplied have outside cylinders, and therefore have not crank axles; the difference in price due to this fact is at once apparent. The indictment of the government goes on: British builders are compelled to obtain certain materials from two or three makers, whose products have been found to give the most satisfactory results in working, but which are, not unnaturally, costly. *Engineering* remarks that if American contractors were not so bound, the British builders were at a decided disadvantage. Turning for an illustration to shipbuilding it is pointed out that if a ship is constructed to order, and if Smith's pumps, Brown's winches, and Jones' steering gear, are specified, the stimulus of competition is absent, and the price goes up accordingly. In some cases a choice for locomotive material is given between two large firms, but the advantage is nearly always illusory, for such firms often have a tacit understanding not to cut prices. "If purchasers," says *Engineering*, "or rather their professional advisers—would simply specify physical tests for material, it would do much to cheapen production. Unfortunately, it is a simpler thing for the consulting engineer to bind the contractor to go to a particular firm, the goods of which are by long experience, known to be beyond reproach, but which takes advantage of its reputation to charge prices out of all reason."

The concluding column of the editorial is devoted to considering German competition with British locomotive builders.

Steam Distribution for Locomotives

Proceedings Northwest Railway Club, Oct., 1901.

Mr. H. T. Herr, Division Master Mechanic of the Chicago Great Western Railway, read a paper on the above named subject. Among other things he said: The locomotive may be said to hold in equilibrium three fundamental forces—the steam producing power, or boiler; the transmitting power, or machinery; the tractive force, or adhesion. The cylinders are able to transform into useful work from 8 to 12 or 15 per cent. of the energy stored by the boiler, the efficiency of the latter relative to the heat units supplied to it being probably somewhere between 50 and 70 per cent. Not only is the distribution of steam affected by the design of the valve motion, but also materially so by the setting of the valve.

Two tables are given, one contains a statement of that which is important to know in laying out valve motion, and

the other the effects of various alterations in setting the valves.

TABLE I.

Nature of service (A) passenger; (a) heavy, (b) light, (c) local or suburban; (B) freight; (a) dead freight, (b) time freight, (c) helper or hill, (d) switch.
Work required, passenger and freight; (a) comparatively high speed; (b) comparatively low speed.
Character of assigned district; (a) Undulating country, with variable gradients; (b) hilly country, with continuous gradients; (c) level country.

TABLE II.

(1) Increased Outside Lap.
(a) Admission is later; ceases sooner.
(b) Cut-off is earlier; expansion longer.
(c) Release is unchanged; exhaust period unchanged.
(d) Compression is unchanged; period unchanged.

(2) Increased Inside Lap.
(a) Admission is unchanged.
(b) Cut-off is unchanged; expansion period longer.
(c) Release is later; exhaust period shorter.
(d) Compression is earlier; period longer.

(3) Increased Travel.

Case I.—Inside Lap Position.
(a) Admission is earlier; continues longer.
(b) Cut-off is later; expansion period shorter.
(c) Release is earlier; exhaust period longer.
(d) Compression is later; period shorter.

Case II.—Inside Lap Line and Line.
(a) Admission same as Case I.
(b) Cut-off same as Case I.
(c) Release unchanged; exhaust period shorter.
(d) Compression unchanged; period shorter.

Case III.—Inside Lap Negative.
(a) Admission same as Case I.
(b) Cut-off same as Case I.
(c) Release later; expansion period shorter.
(d) Compression earlier; period shorter.

(4) Increased Angular Advance.
(a) Admission is earlier; period unchanged.
(b) Cut-off is earlier; expansion period unchanged.
(c) Release is earlier; exhaust period unchanged.
(d) Compression is earlier; period unchanged.

The above four subdivisions of Table II apply to the ordinary slide valve actuated by a single eccentric, and were deduced from a study of the Zeuner valve diagram.

With the link motion a more complicated action occurs, due to the combined effects of changes in both the travel and angular advance, as the link is raised or lowered.

The effects of raising the link from full gear forward motion comprise both elements enumerated in sections (3) and (4) of (Table II), but in such a way as to give the following:

TABLE III.

Effect on the Distribution of Raising or Lowering the Link from Extreme Position Toward the Central Position.
(a) Admission is earlier; period shorter.
(b) Cut-off is earlier; expansion period longer.
(c) Release earlier; exhaust period dependent on inside lap.
(d) Compression is earlier; period longer.

As the design of the valve motion should be such as to give the best results at the running cut-off, so also is it important to consider this the prime factor in the setting of the valve. With the ordinary link motion as applied to American locomotives, the following axioms have been deduced, not only by a study of the link motion itself, but also by results obtained in actual practice, as to the effects on the distribution of steam in a Stephenson link motion, due to reduction of lead or increased angular advance, changes in outside lap and maximum port opening, for variable cut-offs from half stroke to mid-gear:

(1) The greater the per cent. of the stroke the cut-off is, the less is the proportion of the reduction of the maximum port opening to lead.
(2) The nearer the maximum port opening approaches zero, the less is the proportion of the reduction of the maximum port opening to lead.
(3) The greater the reduction of lead, the later the release.
(4) The greater the reduction of lead, the larger the expansion.
(5) The greater the reduction of lead, the later the compression.
(6) The greater the reduction of lead, the longer the compression period.
(7) The greater the reduction of lead, the later the admission.
(8) The greater the reduction of lead, the later the maximum port opening.
(9) The maximum port opening and lead are directly proportional to the outside lap for the same angular advance and cut-off.
(10) The greater the outside lap, the greater the travel for a given maximum port opening.

Many engineers and other mechanical men, claim that by giving an engine lead, it makes her "smart," i. e., she will be able to start a train much quicker. This is an erroneous idea.

CONCLUSION.

(1) The design of the valve motion as a whole is as important as any other single element of the locomotive, and in its solution consideration should be given to the nature of the service to which the engine will ultimately be assigned.
(2) The distribution of the steam at the probable running cut-off is the most important point for the proper action of the valve motion, and its elements.
(3) The full gear adjustment should not be allowed to influence the setting of the valve to the detriment of the running cut-off.
(4) A greater reduction of lead than is generally found in practice is advisable, as is also an increased outside lap and travel.
(5) Some form of double or multiple ported valve is valuaable, and should be used, especially in high-speed work.
(7) The Zeuner and Harmonic valve diagrams are material aids to the solution of all slide-valve problems, the latter especially so because it is possible to design an instrument to take such diagrams from an engine in actual service, and thus study the effects of valve setting.

The Tendency of American Locomotive Practice

Cassier's Magazine, July, 1901, p. 259.

The most important feature of the tendency of present locomotive practice in the United States appears to be the recognition of what is known as the Atlantic type engine, which, by the way, now holds the world's record for sustained speed, running on the Philadelphia & Reading Railroad. The advantages of the Atlantic type, as pointed out recently by Mr. F. W. Dean before the New England Railroad Club, are that the driving wheels are entirely in front of the fire-box, and that the fire-box can thus be made wide. More grate area can be obtained than in the ordinary locomotive without excessive length of fire-box. Great length of fire-box means difficulty in firing. The Atlantic type not only gives great width of fire-box, but also considerable depth, because there is underneath a small pair of trailing wheels. The trailing wheels serve also to carry the extra weight of the large fire-box and boiler. In this way boiler capacity is very much increased. The tendency in the large locomotives in the last few years has been to increase the heating surface, while the grate area remained constant, but by the use of the Atlantic type, the grate of the locomotive is very much extended, and keeps pace with the heating surface. Very wide fire-boxes were used with eight-wheel, four-coupled, anthracite-burning locomotives, long before the Atlantic type of engine was brought out, by extending a shallow fire-box over the rear driving wheels, but large wheels make their design impracticable.

The Four-Cylinder Balanced Compound

American Engineer and Railroad Journal, Nov., 1901, p. 355.

Superintendent of Motive Power writes the *American Engineer* as follows:

For several years the belief has been growing upon me that we ought to thoroughly investigate the four-cylinder balanced compound locomotive in this country, but I have not before seen so many advantages outlined in its favor as appear in the editorial in the *American Engineer and Railroad Journal* for October. These I do not consider as sure of accomplishment, at least some of them, but it is safe enough to state them all as inducements for a thorough trial of the idea. It is by no means certain that the matter of repairs will be as simple as you appear to believe, and the crank axle needs a great deal of nursing before it will answer for the requirements of modern American locomotives. But that these necessarily constitute unremovable obstacles I decline to believe. I am not afraid of the crank axle.

In spite of all we can do engines must be heavy, for power must be had. Instead of making them heavier we should attack the problem of getting more power out of weights which we now have, and when track and bridge construction are up to it we may begin to think of increased weights. It is not to provide for the future so much as to reduce the present difficulties that this type appear to me attractive. What we most need is to be able to build eight-wheel and Atlantic type engines which will do the work of six-coupled, ten-wheel engines as these are now built. We have not yet reached the limit of the eight-wheel engine.

If we can overcome the difficulties with crank axles and obtain satisfactory valve motion with but a single pair of valves for the four cylinders, we ought to be able to increase the present wheel weights to such an extent that we can carry 100,000 lbs. on four drivers, or perhaps 120,000 lbs., without damaging the track as much as the present weights. Experiment would determine the lengths to which this may be carried, but if we can make four drivers do the work now required of six and can make six do the present work of eight, this system will be the relief we all are seeking.

You probably know that the Baldwin Locomotive Works are now building an engine to test this principle on the Plant System it will be watched with the greatest interest.

Transfer Table for Locomotives

Revue Generale des Chemins de fer, May, 1901, page 462.

The Orleans Railway of France has installed an electric transfer table at the Quai d'Orsay, in Paris, for handling electric locomotives having a weight of from 48 to 50 tons. The table requires no pit. The locomotives running into the depot are usually electric, with an occasional steam engine having a tender. The transfer table is located at the ends of the track, and is used for carrying the locomotive across from the incoming to an exit track, so that the trains need not be disturbed.

The table is very fully illustrated, and has a novel feature in the form of roller bearings for its axles. There are two sets of rollers for each journal. Those of the second set serve to separate those of the first from each other. They are themselves guided at their ends, where their section is reinforced. The diameter of the shell is so calculated as to avoid all shipping in the direction of the motion of the car.

Good Headlights

Railway and Locomotive Engineering, Nov., 1901, p. 483.

There is considerable discussion among locomotive men about the present form of oil-burning headlight, in which its position high above the track gets the severest criticism.

Originally the headlight was designed to show the position of switches and signal boards and throw light on obstructions while they were far enough away so the engineer could stop, or reduce speed to a safe limit, before striking an obstruction. The oil lamp will not serve that purpose if the engine is moving over 10 miles an hour.

Headlights, when first used, were located on the front of the smoke arch, just high enough so the door would swing open under the brackets. With extension fronts they were placed on top, still farther above the track, and now on the large, modern engines they are, some of them, 13 or 14 feet above the ground. From this elevated position very little of the light shows on the switch targets or flat cars that do not clear the main track, and still less on misplaced switch rails or obstructions close down.

On these large engines there is plenty of room to set the headlight down below the smoke arch, above the pilot and frame back next the cylinder saddle; it is in no more danger of damage from striking cattle, etc., than the other lights were years ago. In this position the strongest part of the beam of light would be just where it is needed, about 4 feet above the ground—instead of 14 feet—so that flat cars could be seen as far off as box cars, and animals or low obstructions be visible many times the distance with the high headlight. The beam of light close to the ground would attract the attention of persons about to come on the track and warn them to stop till the engine had passed; the high headlight close up to the person never does that.

The lower position of headlight, wherever it may be, would also do away with a class of accidents that are becoming all too numerous—falling down from the front end when fixing the headlight. To get up on top of a hot smoke arch and fix a defective lamp, or even adjust it so as to give a better light, is getting to be a risky business. The hand-rails and steps along the side of the arch are so hot that it is not safe to touch them with the bare hand, and if the engine is moving, a slip will surely disable a man.

Headlights were an American safety device, but they are no longer entitled to that name, unless they are powerful enough to show as far as safety demands and placed where they will do the most good without risking the life or limbs of the engineer.

[We have known engineers complain that the beam from the headlight more often illuminated the roofs of tunnels than it did the track. Slightly tilting the lamp case up at the back or vertically altering the position of the flame in the reflector will often bring about a very noticeable improvement.—Eds. Railroad Digest.]

Experience With Good Boiler Water

Proceedings St. Louis Railway Club, June, 1901, p. 4.

Mr. Henry Miller, Assistant Superintendent of the Burlington Route, at Hannibal, Mo., read a paper at the June meeting of the St. Louis Railway Club, showing the effect of good water on locomotive performance. He said that two ordinary standard type locomotives on the Burlington Route ran 12,120 miles each during the month of May, and are now doing the work formerly done by four engines. They are kept in continuous service without being cooled down, and are washed out only twice a month, making over 6,000 miles. A fine quality of water produced by a new process of filtration makes this possible. The engines are giving almost perfect service, and there is no foaming or flue trouble.

Fireless Locomotives

Trade Journals Review (London), July 15, 1901, p. 26.

A fireless locomotive has been built for use on light railways, collieries, engineering works, etc. It consists mainly of the framework, wheels, a tank, and the driving parts. It does not generate its own steam, for it carries in the tank highly heated water, supplying the high-pressure steam, which it receives from a stationary boiler plant or ordinary locomotive. To work the locomotive the reservoir is filled about two-thirds with warmed water, which is further sufficiently heated by steam under high pressure until the steam pressure is about equal to that of the supply boiler. When charged, the engine will do average work for about half a day. The steam spent when the locomotive is working is immediately replaced from the water, but, of course, the pressure gradually fails. To equalize the varying degrees of pressure the cylinders must be large enough that with a pressure of three atmospheres the locomotive is still capable of working, and at one atmosphere is able to propel itself. The following are its principal dimensions: Cylinder diameter, 16.929 inches; piston thrust, 15.748 inches; wheels, diameter, 31.496 inches; rail gauge, 56.495 inches or 4.7 feet; weight empty, 10 1-2 tons; weight filled, 13 1-2 tons; highest steam pressure, 132.3 lbs.; water about 183.078 cubic inches; steam space, about 91.539 cubic inches.

"What's in a Name?"

The boys who fire the oil burners call the coal burners "muzzle loaders." The big compounds (twelve-wheelers) are called "possum bellies." Some of the Santa Fe engines running into Mojave are called "tarantulas" and "cotton tails."—*Locomotive Engineering.*

[The Vauclain compounds on the Intercolonial of Canada are called "Doukhobors," after the Russian sect which settled in the Northwest Territories of Canada.—Eds. Railroad Digest.]

Oil Burning in Locomotives

Pacific Coast Railway Club, June, 1901, p. 54.

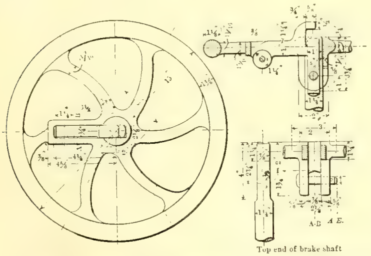
At a meeting of the Pacific Coast Railway Club, the discussion on the subject of burning oil in locomotives brought forth the following facts: An engine and ten cars made 207 miles using as fuel 1,000 gallons of oil which cost about 1.8 cents a gallon. The trip generally consumed 8 or 9 tons of coal, at $4.50 a ton. Thus the amount saved by using oil was about $36 or $40 worth of coal. The increase in weight of a train or its going against a strong wind, does not demand a greater increase in oil consumption than in coal, but perhaps less. An oil-burning steamer, formerly using about 36 tons of coal for a certain journey, now does it with 6,000 gallons of oil, which is quite a saving. Further proofs of the cheapness of oil as a fuel were elicited, and when a proper firebox is designed in which oil can be consumed perfectly, its superiority over coal, both in cheapness and in heating power, will be beyond all doubt.

Car Equipment, Appliances and Related Matters

A Folding Brake Wheel

American Engineer and Railroad Journal, Nov., 1901, p. 359.

For use on cars of passenger trains where the usual arrangement of the brake wheel would be in the way of vestibules, Mr. C. A. Schroyer, Superintendent of the Car Department of the Chicago & Northwestern Railway, designed the brake wheel illustrated in the accompanying engraving. The wheel is turned up out of the way when the car is coupled to one having a vestibule and when in use the brake wheel is held rigidly in place.



A Folding Brake Wheel—Chicago & Northwestern Railway.

The wheel pivots on the pin shown in section below the center of the wheel and revolves so that the left-hand side, as seen in the engraving, moves upward and to the right. The hook on the top of the dog over the center of the brake staff is used to raise the dog so that the wheel will turn up out of the way. At the last minute we note an error in the engraving. The top of the brake staff should not be shown in the dotted lines and the cross-section of the metal in the wheel should be shown against the top of the shaft so as to indicate an abutment for the wheel to rest against. To fold the wheel over, the dog is lifted and the wheel is free to move. When returned to place the dog drops into position and locks the wheel.

Conversion of the European Screw to the American Automatic Car Coupling

Glaser's Annalen fur Gewerbe und Bauwesen, August 15, 1901, p. 75.

The article is an illustrated one and shows the method by which a coupler of the M. C. B. type can be applied to the German hook and screw coupling. The means employed is to key a sleeve over the stem of the hook. This sleeve branches out so that the whole forms a Y with the ends of the arms on either side of and in line with the hook. These ends are arranged to pivot with corresponding arms forming a short shank of the drawhead.

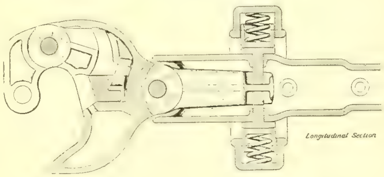
When used as an automatic coupler, the two arms are pinned to those of the drawbar and the latter stands out in front of the hook, with the knuckle about in line with the side buffers. When the screw coupling is to be used, one of the connecting pins is removed and the automatic drawhead is turned aside and fastened to the end sill, leaving the hook free to be used with the ordinary coupling.

Washburn Flexible Coupler Head

Railroad Herald, Nov., 1901, p. 6.

These couplers consist of a head, which has a shank telescoped into the hollow shank or back of the coupler, in which it is pivoted by means of a steel pin. On passenger couplers as shown in the cut, the tail of the head operates upon springs by means of studs and thimbles, and is centered by the action of these springs at all times. In passing curves, the head pulls at all times, upon the central line of the track, and the head and shank yield from side to side under the action of the springs.

The elimination of heavy lateral strains decrease to an incredible extent the wear upon the knuckle and upon the contour lines of the head. Knuckles in passenger service wear out usually within a few months. A pair of flexible head couplers in constant use on a long and hard run used the same knuckles for over two years, and they were not worn to any considerable extent. At the present time one of these knuckles is still in use, having run two years and a half.



The flexibility of the head keeps the coupler at all times over the central line of the track, and the pull being on that point, the cars following will rest and run fairly on the rails, and there will be no friction between the flanges of the wheels and the head of the rail, thereby reducing the load of the engine, and consequently increasing its ability to move the train, and decreasing the flange wear upon the wheels, and the wear upon the head of the rails.

The absence of strain upon the car, reduces the wear and tear upon the platforms to a minimum, and also the strain upon the car in every part. The jolting and jarring of the cars is reduced to a very great extent as the pull is always in the center, and the vibrations from the car preceeding and the car following in the train are absorbed by the flexibility of the head of the coupler.

This flexible head coupler is manufactured in various styles to suit different classes of equipment; the passenger coupler, the freight coupler, three types of pilot couplers, several types of tender couplers, and combined with the spring buffer for service upon passenger locomotives.

This coupler is sold by the Washburn Coupler Co., of Minneapolis, Minn.

Railway Cars at the Paris Exposition

Zeitschrift des Vereines Deutscher Ingenieme, August 10, 1901, p. 1117.

The article opens with a tabulated list of the 111 railway cars that were exhibited at the Paris Exposition in which is given the names of the exhibitors, builders and railroad for which the car was intended; the type of the car, the length over

frames and buffers, the number of axles, total wheel base, capacity and classification, and light and loaded weights. The cars are arranged àccording to countries, and include France, Russia, United States, England, Belguim, Austria, Hungary, Germany and Italy.

From an examination of this table based on the assumption that the cars, shown at the exposition, are of the latest types, one is led to the conclusion that the construction of passenger cars with rigid axles, a short wheel base and side doors is about as good as given up; while, on the other hand, the construction embodying a through communication from car to car with a long wheel base, whereby greater ease of riding is obtained, has about become the order of the day.

Westinghouse High Speed Brake

Proceedings New York R'd. Club, Sept., 1901, p. 36.

The following are extracts from a paper read by Mr. F. M. Nellis. The high speed brake will bring trains to an emergency stop in 30 per cent. less distance than the best brakes of the ordinary quick action type, and this is accomplished by the simple addition of a few parts to the standard air-brake devices already on the locomotive and cars and which converts the ordinary brakes into high speed brakes (as illustrated by the heavy black lines in the engraving) and by increasing the train line pressure from the ordinary standard of 70 lbs. to the 110 lbs. high speed train line pressure.

For modern high speed trains much better brakes are necessary than when 40 or 50 miles an hour were considered high speeds. At a speed of 60 miles per hour about five times more braking power is required to stop the train than at 30 miles per hour, and more than two and a half times than if the train were running at 40 miles per hour. At 70 miles per hour about five times as much braking power would be required to stop the train in the same distance it would be at 35 miles per hour.

The principle of the high-speed brake is simple and effective. It gives an abnormally high braking pressure when applied in emergencies at high speeds and gradually reduces the pressure on the brake shoes as the speed of the train reduces, thereby applying the greatest retarding force when the sṕeed of the train is high and there is less danger of sliding the wheels, and gradually reducing it as the speed reduces, and the danger of wheel sliding is thereby reduced to a minimum. At the moment of emergency application the high speed brake throws 40 per cent. more pressure on the brake shoes than is ordinarily had in emergencies with the ordinary quick action brake. In addition to the advantages derived from the quick action brake in venting its increased train pipe pressure to the brake cylinder and mechanically reducing it in emergencies as the speed comes down, it offers exceptional advantages in ordinary service stopping, inasmuch that the automatic reducing valve, being regulated at 60 lbs. pressure, will permit all pressures above the safety limit to escape to the atmosphere very rapidly. It also holds sufficient pressure to make two or three ordinary sérvice stops without it being necessary to recharge the auxiliary reservoirs. Thus an engineer always has in reserve enough pressure, even after making two or three service applications, to obtain an emergency application of the brakes equal to that given by the ordinary quick action type.

The high pressure control apparatus is a similar though modified arrangement, typical of the high speed brake, and is adapted to freight train service on mountain grades where empties are hauled up the grades and loads are dropped down, thus requiring a high brake power while coming down and a lower braking force in ascending the grade. By the mere turning of a cock the change from low pressure to high pressure, or vice versa, is quick and unerringly made.

Draft Gear Service Tests

Railway and Locomotive Engineering, Nov., 1901, p. 499.

A valuable service time test of the comparative merits of the friction draft gear and the twin spiral spring gear has recently been furnished by the Butte, Anaconda & Pacific Railway Company, endorsed by the immediate operating officials of that line. Heretofore, no good opportunity has been offered to satisfactorily test the respective merits of the two types of gear in service, and it was believed that considerable time must necessarily elapse before any definite and valuable service time data regarding the respective merits of these two devices could be obtained. However, the data seems to be valuable and decisive, inasmuch as it is obtained from 50-ton cars in heavy coal and ore service.

The railroad above mentioned has in service 520 50-ton pressed steel cars which run between the copper mines in Butte and the smelters in Anaconda. One of the connecting lines has a similar number of 50-ton steel cars, equipped with the twin spring draft gear, which are engaged in the coal traffic over the Butte, Anaconda & Pacific Railway. A record of draft gear failures and mileage made for six months ending May 1, 1901, gives a total of three failures for the Butte, Anconda & Pacific cars equipped with the friction draft gear against ninety for the foreign cars equipped with the twin spring draft gear. It appears that the average monthly mileage of the foreign 50-ton cars over the Butte, Anaconda & Pacific road was 15,738 miles, while that of the Butte, Anaconda & Pacific cars was 135,650, or 8.6 times greater than that of the foreign cars.

A noticeable feature of this test shows that of the breakages, thirty-five were couplers, thirty were knuckles and twenty-five were yokes. The breakage of the yokes goes to show that the very heavy stresses are in the direction of greater breakages, viz.; that of tension when the train is stretched.

On the Butte, Anaconda & Pacific cars, but three couplers were broken, and no knuckles or yokes. Compared with the thirty-five broken couplers on the foreign cars and allowing for the home cars making 8.6 greater mileage, the breakage of couplers only, on an equal mileage basis, on the foreign cars with the double spring draft gear, was 100 times as great; or, 300 couplers instead of three would have been broken on Butte, Anaconda & Pacific cars had they been equipped with the spring draft gear. This saving in coupler breakages for six months' service by the use of the friction draft gear on 155 cars was enough to pay the entire cost of the friction draw gear with which they were equipped, to say nothing of the time the damaged cars were thrown out of service while being repaired.

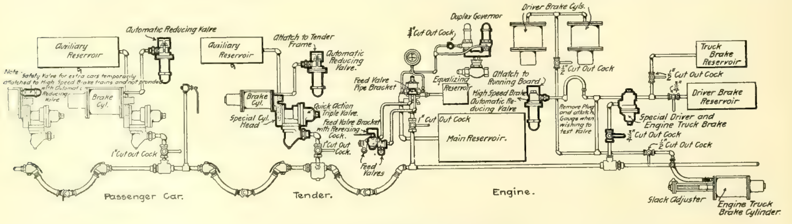
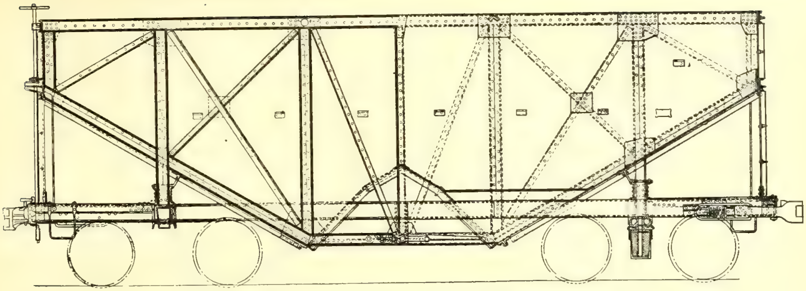


Diagram to Show the High Speed Brake Attachments.

The Special Parts are Shown in Heavy Lines.



Vanderbilt Steel Hopper Coal Car—Lackawanna Iron & Steel Company.

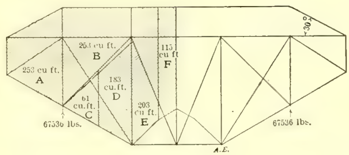
Vanderbilt Steel Hopper Coal Car

American Engineer and Railroad Journal, Nov., 1901, p. 338.

Mr. Cornelius Vanderbilt is the designer of a new steel hopper coal car of 100,000 lbs. capacity, to be built for the Lackawanna Iron & Steel Company. Its construction presents new and interesting features which have been patented. The construction throughout employs structural steel shapes and plates. The leading dimensions of the car are as follows:

Light weight	36,500 lbs.
Weight of body	24,000 lbs.
Total capacity, coal	111,072 lbs.
Total capacity, ore	120,000 lbs.
Cubical capacity (30 degrees heap)	2,136 cu. ft.
Cubical capacity, level full	1,822 cu. ft.
Length, over end sills	31 ft. 10¼ ins.
Length, inside	30 ft. 0 ins.
Width, over all	9 ft. 11¼ ins.
Width, inside	9 ft. 0 ins.
Height, rail to top or brake staff	11 ft. 11 ins.
Height, rail to top of body	11 ft. 3 ins.
Height, rail to bottom of hopper	1 ft. 7 ins.
Height, rail to center of sills	3 ft. ¾ in.

In order to secure the necessary strength with minimum dead weight the side framing is constructed in the form of trusses, to render their weight available in assisting in carrying the load. This idea has been employed before, but Mr. Vanderbilt's design is the first to take advantage of the entire depth of the side from the top rail to the bottom of the hoppers for this purpose. These trusses do not end at the floor line, but extend the full depth of the sides to the bottom of the hoppers. In fact, the side frames, used in this way, render it possible to reduce the center sills to 9-inch, 25 lbs. channels and side sills are omitted entirely. Steel plate ¼-in. in thickness forms the body of the car and is riveted to a trussed frame of channels stiffened and braced by angles, as indicated in the drawing. All of the chord, vertical and post members are of channel section, with a liberal number of angles and gussets. There are two hoppers with ridge plates over the center sills, and at the sides of the hoppers the bottom chord is a substantial channel connecting the sloping end channels and receiving, by means of gussets at its center, three of the bracing angles. The body bolsters are built up in the form of a box girder, with a lower or compression member in the form of a large channel receiving the center plate and bent up to meet the ends of the transverse channels. The center sills pass between these two portions of bolster. The upper plate of this box girder is bent to form an attachment between two transverse angles riveted to the outer surface of the hopper plates, giving substantial support to the structure and constituting a rigid tie across the car at this point. At the ends of the body bolsters the load from the side frames is transmitted by vertical channels. The four points of support of the side frames are therefore at the ends of the bolsters and these vertical channels are riveted directly between the bolster channels. At the termination of the sloping floor channels, transverse channels pass across the ends of the car in such a way as to transmit end thrusts from the load to the



Stress Diagram.

side frame trusses. At the top of the sides and ends 6½-in. channels give strength and stiffness. Cross ties of rods, protected by inverted angles, are provided at two points along the upper chords, while under the floor plating transverse tieing is provided for the lower portions of the sides. Channels are used for end sills, with castings to reinforce the center portions and compensate for the coupler shank openings. At the corners of the under-framing bracing angles are riveted to the inner faces of the end sills, reaching diagonally to the center sills. The brake cylinders are mounted under the ends of the hoppers.

This car is very light. Its estimated weight with trucks is 36,500 lbs., and a new design of truck will probably reduce this weight slightly. In order to compare its weight and capacity with other cars of this type the accompanying table has been prepared.

Comparison of Fifty-Ton Steel Hopper Coal Cars.

Railroad.	Date.	Builders.	Construction.	Contents, 30° heap.	Coal capacity, 30° heap.	Light weight.	Ratio dead weight to paying load.
Lackawanna Iron & Steel Co.	1901	Not yet built	Vanderbilt, structural	2,136 cu. ft.	111,072 lbs.	36,500 lbs.	33.0 per cent.
Norfolk & Western	1900	N. & W. Ry	Composite	2,038 cu. ft.	112,000 lbs.*	38,000 lbs.	34.0 per cent.
Lake Shore	1899	Pressed Steel Car Co.	Pressed steel	2,072 cu. ft.	107,740 lbs.	36,600 lbs.	34.0 per cent.
Lake Shore	1900	Am. C. & F. Co.	Structural	2,140 cu. ft.	111,280 lbs.	38,300 lbs.	34.4 per cent.
Cleveland & Pittsburgh	1899	Pressed Steel Car Co.	Pressed steel	2,127 cu. ft.	110,600 lbs.	39,325 lbs.	35.6 per cent.
Baltimore & Ohio	1899	Pressed Steel Car Co.	Pressed steel	1,875 cu. ft.	97,500 lbs.	34,800 lbs.	35.7 per cent.
Northern Pacific	1898	Gillette-Herzog	Composite	1,842 cu. ft.	95,780 lbs.	37,400 lbs.	39.6 per cent.
Baltimore & Ohio	....	Pressed Steel Car Co.	Pressed steel	1,886 cu. ft.	98,072 lbs.	36,700 lbs.	37.4 per cent.
Erie	....	Pressed Steel Car Co.	Pressed steel	2,030 cu. ft.	105,560 lbs.	36,300 lbs.	34.4 per cent.
P. R. R.	....	Pressed Steel Car Co.	Pressed steel	2,056 cu. ft.	106,912 lbs.	39,600 lbs.	37.4 per cent.
L. V. R. R.	....	Pressed Steel Car Co.	Pressed steel	2,030 cu. ft.	105,560 lbs.	36,600 lbs.	34.5 per cent.

*Actual weight of test load.

Improved Freight Car Construction

Railroad Herald, Oct., 1901, p. 10.

In regard to the design of body bolsters Mr. John S. Francis says:

A little investigation in this matter will develop the fact that if the present ratio of depth of truss is maintained, the body bolster will have to be reinforced, as the metal bolster may carry the load for which the car is rated, providing, however, the load is properly distributed; but if the load is placed on one end of the car, the bolster will come down to the side bearings and when once set will always stay there.

The fact that side bearings on steel trucks and body bolsters are given one and one-fourth inch clearance is a confession of weakness—that the latter will deflect. Such clearance causes a heavy rocking motion to the car body which is injurious to the upper frame of box and stock cars.

Up-to-date practice would dictate that at least one per cent. of the weight of car should rest on cushion side bearing. However, the bolster should be fully tested to carry full capacity of the car, to provide for the emergency of the load being placed on one end. The cushion should be graduated, composed of three coil springs; the center or weaker coil should be of such length as to keep the side bearings in slight contact, so as to anticipate the swaying motion of car body. The second or intermediate coil to take up the ordinary swaying, and the third or heavier and outside coil, to take up the extreme rocking motion.

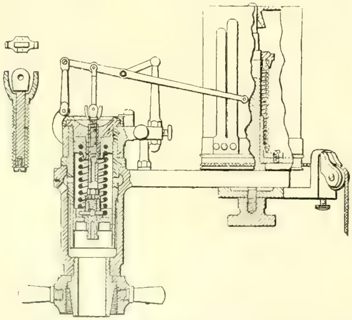
Like a drowning man grasping at a straw, an attempt is being made to prevent longitudinal displacement of draft gear, by butting draft timbers against the bolster and placing filler pieces between bolsters. The shrinkage and compression of draft arms and filler pieces result in lost motion, causing the bolster to be driven towards the center of the car. Thus it will be seen that the main resistance is taken up by the two center sills. This will make it apparent that the bolster should be so constructed that the resistance will be distributed to all the sills equally.

Shop Practice, Machinery and Tools

Star Improved Steam Engine Indicator

Railroad Gazette, Nov. 8, 1901, p. 771.

This instrument shows the latest improvements that the Star Brass Mfg. Co., Boston, has made in steam engine indicators. In outward appearance it is somewhat like the Thompson indicator and the pencil movement is the Thompson improved.



One improvement which the manufacturers emphasize is the attachment of the cylinder cap to the interior shell within which the piston moves, rather than to the outer shell, thus giving correct alignment. The interior shell is removable and this arrangement also provides a jacket space filled with live steam around the interior shell.

Another feature to which attention is invited is the hard rubber non-conducting covering on the edge of the cylinder cap. This covering can be handled with comfort. As every one who has operated an indicator knows, it is impossible to unscrew the ordinary cap without burning the thumb and finger. There is also a vent tube for carrying away the waste steam and hot water that blows past the piston. This tube is attached to the side of the cylinder and extends below the body of the instrument to clear it, and prevent hot water from dripping on the hand of the operator while turning off the indicator cock.

The piston rod has an adjustable swivel-head by which the position of the pencil arm can be varied and the atmospheric line drawn at any distance from the lower edge of the card, without removing the piston from the cylinder. It is only necessary to screw the swivel-head up or down the desired amount. A new detent motion is used. It has a friction clutch which is simple and effective, a ball being thrown into contact with a groove in the circumference of the drum-base. The manufacturers are prepared to furnish a complete outfit for indicating.

Caulking Flues in Running Repairs

Railroad Gazette, Nov. 8, 1901, p. 770.

The illustrations show the Flue Caulker made by the Columbian Manufacturing Co., Columbus, Ohio; also sketches showing tools that have been used, when some difficulties here related were met. The Columbian caulker is made for every size of flue.

Some railroads have a standard bead, and all their caulking tools are filed to a template; while some try for a standard, but pay no attention to having all tools filed alike. In the latter case the boilermaker at one terminal may have his

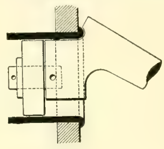


Fig. 1.

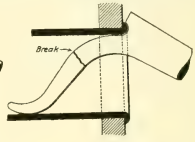


Fig. 2.

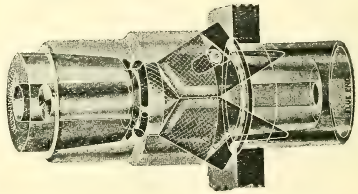


Fig. 3.

caulking tool filed for a ⅜-in bead, while at the other terminal the tool may have been filed for a 5-16-in. bead. Where it is convenient for the boilermaker to hold the tool properly, the flue is caulked standard, but where it is inconvenient the flue is not caulked standard, nor is it as well caulked.

In watching the boilermaker using the single tool, one will observe that nine out of ten will hold the single caulking tool practically straight, in which position the bead is only driven to the outside of the flue sheet. The "bootleg" of the tool does not come in contact with the flue on the inside and set it out against the flue sheet as it is intended to.

On some roads there has been an effort made to have a standard bead, and all tools used have been filed at one place on the system; and tools have been designed to require the boilermaker to hold the tool at the proper angle. Fig. 1 was found to be impracticable, as the boilermaker could not handle it with any degree of satisfaction. Fig. 2 was tried, which al-

lowed the operator a little variation from the angle. This worked for a while, but in the course of a month several of these were broken off near the line shown, and the broken tools showed all the wear, whereas the ones that were not broken had not been used at all.

To accomplish the desired result the Columbian Central Flue Caulker, Fig. 3, was designed, and after 12 months' service it proven satisfactory. It cannot be held in any but a central position. It also caulks the flue uniformly and firmly, setting it out against the flue sheet hole, serving the double purpose of an expander and caulker. It is impossible for it to cut the sheet and it will work in the side and top flues as well as those in the center of the sheet. The tool is easily manipulated and commends itself to those who are interested in improving methods of caulking flues.

Chisel and Punch Handles

Iron and Steel, Nov. 2, 1901, p. 18.

John J. Flycht, an inventive machinist, has placed on the market a handle that successfully holds cold chisels and punches firmly and securely without any jar to operator. From the illustration it will be seen the handle is simple and strong, and,

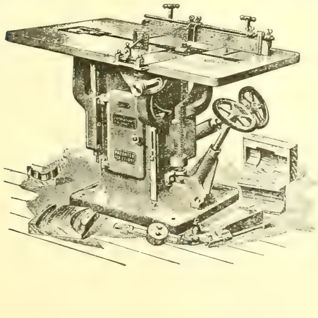
what is most important, can be sold at a very low price. Some of the leading railroads and machine shops of Chicago are large users. In a recent interview Mr. Flycht said: "If you try one you would never be without it, because it does not jar in the hand, it does not break the handle, and never drops off the handle. It is a new, reliable, and useful tool, made in a practical and scientific way. It can be used for either chisel or punch. When handle is unscrewed, push spring back and unhook the rod from the wire that goes around the tool. The handles are made in two sizes for 1¼ square steel and 1 inch octagon. Separate pieces can also be had."

New Core-Box Machine

Railway and Engineering Review, Nov. 2, 1901, p. 714.

The J. A. Fay-Egan Company, of Cincinnati, has brought out a new core-box machine for which great speed and accuracy in making core-boxes is claimed and in doing any work requiring recessing, duplicating, etc.

The machine will cut semi-circular core-boxes of any length, and from 1 to 20 in. in diameter. Semicircular core-boxes closed at the ends with recesses of different diameters can be



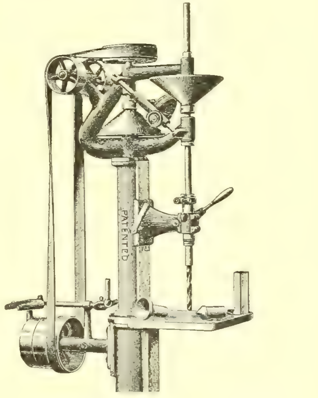
made rapidly and with corners of any desired shape. On patterns with internal curves such as the inside of staves, cores, and cutting out the under side of bosses to fit on rounded patterns, the work can be produced very rapidly. For making large fillets on engine and pump frames, and similar patterns, it is unsurpassed, and is a great saving over the old methods of working the curve. It is not necessary to use clear lumber when making the cuts on this machine, as owing to the construction of the cutters, knotty lumber, cutting with or across the grain, a smooth surface is secured. A radius attachment with the machine by the use of which circular core-boxes are correctly produced, such as elbows, etc. The heads used may be set for different diameters, they being so arranged and made that the bits are adjustable; by this arrangement a fewer number of heads need be used to accomplish a wide range of work.

Sensitive, Friction Drill

Modern Machinery, Nov. 1, 1901, p. 164.

The accompanying engraving represents a drill press designed and manufactured by The Knecht Bros. Company, Cincinnati, O. This machine, on account of its originality of design, its ingenious arrangement of mechanism and especially for its very great usefulness in machine and metal working establishments of all kinds, will commend itself as being a most desirable tool.

The driving mechanism consists of two cones and a friction roller. The power is transmitted from the lower cone to the friction roller, which transfers power to the upper or spindle cone. The speed of the drill spindle is increased or diminished instantly without stopping the machine or shifting the belts, without operator changing his position, by simply sliding the frame upon which is mounted the friction roller or transmitter up and down on the cones. Any imaginable number of speeds can be obtained. More or less driving power to the drill spin-



dle is applied, as size of drill or nature of work may require, by increasing or decreasing the tension. This is instantly applied by a simple device, namely, the turning hand-adjuster put under lower driving cone. Extending through both bearings of the housing is a sleeve or bushing to which the driving cone is fastened, relieving spindle of lateral pressure, which enables the machine, when properly oiled, to run any length of time without heating.

On the slide, guiding the friction roller or transmitter, are graduations showing position to place it to obtain proper speeds to drill cast iron. This is a necessary improvement, as it allows the operation of the machine and the manipulation of the work to the best advantage, at a saving of drills and time. There are also graduations on the sleeve passing through spindle head, indicating depth to be drilled. In addition there is a stop collar on

the sleeve, which can be adjusted and set, so as to drill any number of holes a fixed depth, without referring to graduation on sleeve.

The spindle is balanced by a substantial coil spring, so arranged as to secure a perfect balance.

A square table swings on the column and can be swung aside, thus allowing the twist drill to be easily applied to work held in lower knee.

The different manipulations, adjustments and all operations on the drill press are easily made without the operator leaving his position in front of the machine. All the details of the machine are the best that long practice and usage have established as such, and with the company's patented device, render it a machine that will be appreciated.

Sawdust Mortar as a Boiler Covering

Cassier's Magazine, Nov., 1901, p. 82.

Sawdust mortar,—a mixture of sawdust and lime,—has latterly been mentioned a number of times as a good covering for steam pipes, with the virtue thrown in of affording a means of utilizing waste sawdust. Something like twenty years ago a covering of this general character, made up of sawdust and plaster of paris, was used with satisfaction in one large steam plant, not only for steam pipes, but for the boilers as well; but the development since then of specially manufactured non-conducting coverings, in sections so as to permit easy removal and replacing should examination or repair of the covered-in parts become necessary, and at a cost about as low as that of the home-made product, long since led to the abandonment of the latter. It is doubtful, therefore, whether this sawdust mortar of more recent date is worth using except as a makeshift.

Electric Equipment, Machinery and Appliances

Electric Locomotive

Electrical Review, Nov. 2, 1901, p. 539.

An electric locomotive operated by trolley has recently been built by the Baldwin Locomotive Works. It was built for the Atlantic Coast Lumber Company. The gauge is standard. Driving-wheels are 30 inches diameter; journals, 3 3-4 inches by 7 inches; wheel base, 5 feet 6 inches. There are two 74-hp. motors, 220 volts pressure. The full-load speed is about six miles per hour. Full-load draw-bar pull on level, 4,300 pounds; starting draw-bar on level, 5,200 pounds, with clear, dry rail.

Electric Motor vs. Locomotive

Engineering News, Nov. 14, 1901, p. 366.

The question of the equipment of the London underground railways with electric power is taken up, and the merits of the various systems is discussed. Mr. Berg, who read a paper before the Institute of Electrical Engineers, thinks that the alternating current motor cannot compete with the direct-current except in long distance schemes with very few stops, or to mountain roads. He estimates the direct-current system as costing $1,857,000. Deducting the cost of sixty-eight passenger coaches, and the cost of track construction, it leaves $1,442,000 as the cost of seventeen electric locomotives, together with the necessary apparatus to keep them supplied with current. This, he says, is an average cost of $84,800 per locomotive, or at least ten times the first cost of steam locomotives capable of hauling a 180-ton train at 15 miles per hour. If the power-house engines can develop an indicated horse-power on the average, week in and week out, with 2 lbs. of coal, it will be equivalent to a fuel expenditure of 4 lbs. of coal per horse-power actually used in propelling the electric car or locomotive. But a well designed steam locomotive will do almost as well as this, or so nearly so that the difference in coal consumption of the two systems counts for nothing comparatively in computing their relative economy. In comparing the wages cost of operation, the electric motor shows no advantage. The steam locomotive requires two men, while the motor requires one, who is probably paid less than the steam locomotive runner. Against this saving in favor of the motor the cost of wages in the central power station and the substations must be placed. The stations must be kept in operation for nearly or quite twenty-four hours, so that the electric system has small chance to show any saving. In the matter of depreciation and repairs, there would probably be some small advantage on the side of the electric system, although when the costly machinery of the central station is compared it is doubtful. It is almost self-evident that any such saving would be trifling compared with the enormous difference in first cost of the electric system.

If the change proves profitable it will be because of increased patronage and earnings consequent upon the changed motive power. In general it is not mere change in motive power which influences traffic, it is more frequent train service, which the electric system makes possible that advantage may be gained.

Electrical Shunting Engines

Trade Journal's Review (London), Nov. 15, 1901, p. 108.

It has been considered that the introduction of electrical engines in railway goods yards would cause a great saving in locomotive charges. On sidings of the Lancashire and Yorkshire Railway Company, at Castleton, Rochdale, recent trials with satisfactory results have taken place with an electrical locomotive, constructed by Messrs. Tweeddale and Smalley. The locomotive, the weight of which in running order is 22 tons, is mounted on two axles and four wheels, and in order to facilitate shunting operations can be controlled from either end.

Electric Traction Schemes

Western Electrician, Nov. 2, 1901, p. 290.

Nowadays hardly any great engineering or commercial project is advanced that does not contemplate some use of applied electricity. Thus the proposed tunnel between Great Britain and Ireland, which is seriously discussed, is rendered more feasible by the possibilities of electric traction. A plan under consideration provides for a line 51 1-2 miles long from Stranraer, Scotland, to Belfast, Ireland. Of this route 34 1-2 miles would be tunnel, of which 25 miles would be under the sea, which has here a maximum depth of 900 feet. Plants on each side of the channel would supply current to the electric motors on the cars and also to the electric ventilators which would be employed. It is intended that trains be driven at a speed of 60 to 70 miles an hour, so that the actual running time in the tunnel would be a little over half an hour. Twelve years' time and an expenditure of £10,000,000 are estimated as necessary for the construction of the tunnel. It is the financial side of the project that constitutes the principal side of the objection, as it is feared that the traffic returns would not justify the great outlay. However, it is hoped that the government may be induced to give a subsidy sufficient to enlist capital in the work.

Again, to pass from the United Kingdom to France, it may be noted that electric railroading plays a part in the rehabilitation of the port of Marseilles, which has become alarmed at the growing rivalry of Genoa as a Mediterranean port. In order to strengthen her time-honored position Marseilles has under way or in contemplation a number of improvements, among which is the transportation of merchandise from the docks at night by electric railways. This plan would greatly relieve the demand on the dock facilities of the port in an entirely practicable and comparatively inexpensive way.

Electric Railways in Saxony

Consular Reports, Nov. 6, 1901, p. 4.

The traffic on the electric railways of Saxony has increased about 400 per cent. since 1896—taking into account the number of persons carried, the number of cars, and the capacity of the motors—and 150 per cent. so far as the length of the railways is concerned. The length amounts to 221.4 miles. The number of motor cars at the disposal of all the railroads amounted at the end of 1900 to 844 without and 184 with accumulators, and 403 attachable cars. There were 147,645,690

persons carried in 1900, and the number of accidents amounted to 338. In Chemnitz, especially, the railways are well patronized by the working classes, as it enables them to live in the suburbs. The usual fare is but 10 pfennigs (2.38 cents). The line in Chemnitz paid 52 marks ($12.37) last year for every 100 marks ($23.80) invested.

New Third Rail System

Railroad Gazette, Nov. 8, 1901, p. 773.

The Rapid Traction Construction Co., Marquette Building, Chicago, has been formed to market an electric third-rail system, invented by Mr. E. W. Farnham, of the C. B. & Q. The third rail is divided into sections, and a section is charged only while a car remains in that particular section, and these sections can be made of various lengths. The third-rail and feeders are carried on supports alongside the track, and are all inclosed in wooden trunking. Each truck of the motor carries a contact shoe, which always bears against the third rail and mechanically sets the switches, which charge the sections of the third rail. At the ends of a section a short piece of the third rail is suspended on knife edges, and a feeder switch is at either end of this swinging rail; one switch being operated when the car moves in one direction, and the other switch when the car moves in the opposite direction.

When the forward contact shoe engages the swinging section of third rail, the friction is enough to carry the rail forward, closing a switch and charging the section of third rail ahead of the car and before the contact shoe of the rear truck has left the section back of the car. The switch points in contact by a shunt-wound solenoid, one winding carrying current for the motors, and the other a small current for lights or heaters. When the car leaves a section the arm carrying the carbon contact points falls by gravity, leaving the third-rail dead.

The principal claims made for this system are that dangers from a charged third rail, as now used, are avoided, and leakage losses are greatly reduced. The location of the feeders and third rail, whether alongside or between the running rails can be made to suit conditions.

Hysteresis Explained

Trade Journal's Review (London), Nov. 15, 1901, p. 108.

Hysteresis is one of those terrible words that scientific men are so apt to spring upon suffering humanity, but it expresses a very simple and important fact, and is thus very clearly explained. According to the modern theory of magnetism, when a piece of iron is subject to the influence of an electric current and becomes, as we say, magnetised, the operation of magnetisation inside its mass consists of a twisting of its molecules round through a certain arc, dependent upon the direction and strength of the magnetising current. When the current ceases the molecules return nearly to the place they originally occupied, and if a current in the opposite direction is now passed round the piece of iron, the molecules execute another excursion within the mass of the iron, this time in the opposite direction, and this goes on each time the direction of the current is changed. In dynamo machines, both of the continuous-current and alternate-current type, certain parts of the machine which contain iron, as the armature core in the continuous-current machine, and the same in the alternate-current machine if it has an iron core, are subject to this constant to-and-fro motion. Now this motion demands the expenditure of a definite quantity of energy, which, though necessary, does not appear as useful energy in the outer circuit, and therefore appears as a charge upon the total energy delivered to the machine, and is one of the sources of loss that is summed up when taking efficiency tests. The energy so expended further tends to increase the internal losses of the machine. It appears as heat, which passes by heat conduction to the armature conductors, and reduces the current they are able to carry, at the same time increasing the loss due to the current they are able to carry by increasing their electrical resistance.

The Mellifluous Telephone

Electrical Review, Nov. 23, 1901, p. 648.

"Her voice was ever gentle, soft and low;
An excellent thing in woman."—*King Lear.*

How often have you taken the receiver of a telephone and placing it to your ear had your tympanum jarred by a voice that was startling in its likeness to a cat fight? The Chicago Telephone Company has established a school of what is known as "telephonic elocution," to the end that when the busy man flees to the telephone booth and shuts himself in from the harsh discords of the world, he may not have his nerves assailed by accents like mother-in-law "used to make," but may be soothed by the mellifluous "hello" of a well-schooled young woman in the central office. Therefore, from this time forth all applicants for position must have their voices passed upon by an examining board, and, if accepted, they are given a course in vocal training to thoroughly fit them for their work. In addition to these vocal attainments the company requires the young women who apply for positions to possess a good education and good health.

[We remember reading that the phonograph had been put to use in this "connection" in order to reduce the work of central operators. If this be the case, the "Hello" girl with the harsh voice may still be of use for, in answering an irate subscriber, she will press the button and the phonograph, previously charged with mellifluousness untold, will sweetly reply, "Line busy at present, please call again." It may do this with what Artemus Ward called, "a kind of German-silvery voice."—Eds. Railroad Digest.]

Electricity vs. "Smoke-Pipes"

Western Electrician, Nov. 9, 1901, p. 305.

Foggy weather is not conducive to the pleasure of tunnel travel in trains drawn by steam locomotives. The smoke is bad enough at the best, but during a dense fog the discomfort is intensified. London was enveloped in a fog which is variously described as the "black" or "pea-soup" variety on November 3d and 4th. There is no loss without some gain, and so it happened that the attention of the public was forcibly drawn to the conspicuous advantage of electric traction on the underground railways. It is said that while the Central London and City and South London were liberally patronized, only those who had no other resource traveled by the "smoke pipes" of the District and Metropolitan tunnels. Londoners are represented as becoming impatient at the delays in working out the problems of underground electric transit; but in the meantime the arbitrators are calmly taking testimony to determine whether the moderate-voltage direct-current system so generally used is what is wanted under the streets of the English metropolis.

Iron Smelting by Electricity

Western Electrician, Nov. 9, 1901, p. 304.

In a recent article the *Echo des Mines et de la Metallurgie* says that three electric furnaces of 500 horse power each have been erected in the valley of Camonica, Northern Italy, for the manufacture of pig-iron under the Stassano patent. In these furnaces the electrodes are placed at the bottom of the boshes. In the operation of the furnaces the ore is first pulverized; a sample is then analyzed for the purpose of calculating the amount of carbon required to perform the reduction, as well as the necessary amount of fluxes. The quantities of carbon, lime or silica thus determined are pulverized and mixed with the ore. The material is then briquetted, after adding five to 10 per cent. coal tar, and is ready for charging into the furnace. By means of the heat developed around the electric arc, the iron ore is decomposed, the oxygen uniting with the carbon to form CO_2. The latter gas ascends into the upper part of the furnace, where it effects a partial reduction of the ore. To obtain a ton (metric) of metal, 3,000 horse-power-hours are said to be required, costing about 18 francs.

Electric Train Lighting

Electrical Review, Nov. 23, 1901, p. 648.

Of the many applications of electric light, few are more interesting than that applied to the lighting of railway cars. At first sight it may appear that the lighting of a railway car is not essentially different from the lighting of any other space of the same dimensions. This is particularly untrue for the reason that a car is liable to be at any time far removed from a convenient source of power, and that whatever system of electric lighting has been adopted, it must possess storage features, and to be successful, must be self-contained within the limits of the car itself. In the early experiments, steam-driven generators were employed to light the train as a whole by means of conductors extending along its length. This system, while fairly satisfactory for the lighting of trains running as units, was not available when these trains were broken up into their constituent cars. Storage alone has not served to solve the difficult problem, since cars may be sidetracked or delayed beyond the time limit of the battery charge. The only solution that has been satisfactory is the utilization of some of the energy, used to propel the car, to run a dynamo geared to one of the axles and to utilize the current thus generated for keeping the storage batteries replenished.

This system has of late been introduced very largely on a number of railroads, particularly by those operating in the middle-west states.

Among the lines equipped by the Consolidated Railway, Electric Lighting and Equipment Company, using the "axle light," are the Louisville & Nashville and the Atchison, Topeka & Santa Fe, on which 110 cars have been equipped, and also the dining-car service of the Pennsylvania company.

It is believed that the electric system is destined in the near future to supplant other methods of illuminating first-class cars of all sorts and that its advantages will shortly be sufficiently appreciated to have its use extended to ordinary passenger, local and suburban trains. The same power has been successfully applied for operating ventilating fans, which have been of great comfort to passengers in warm weather.

Electric Headlights

Railway and Locomotive Engineering, Nov., 1901, p. 478.

Mr. J. P. Kelly, of Watertown, N. Y., writes to *Locomotive Engineering*:

"At the latest convention of the Traveling Engineers' Association the subject of locomotive lights received considerable attention, and the electric headlight was deemed by those who took part in the discusssion as worthy of adoption by railroads for many reasons, among them being the greater safety and comfort to be had from its use.

"I do not think there is anything in connection with the operation of the locomotive that offers more opportunities for improvement, or that if improved will repay the company better than that of a first-class headlight, and I might add cab lights, for the locomotive.

"That the electric headlight is a life saver and a property saver goes without question, for wherever it has been used it has demonstrated its efficiency in enabling the engineer to detect obstructions in time to stop the train or slow down the speed sufficiently to prevent serious mishap.

"What experience the writer has had with electric headlights indicates that it is desirable for a road using them to employ an expert electrician to care for them, as then the very best results obtainable would be had.

"There are two things about the electric headlight which, if improved, would enhance its usefulness, and would remove an annoyance sometimes experienced during the long nights of winter when, if the locomotive be on the road the whole night, light is required for twelve or fourteen consecutive hours.

"The first is the method of focussing the light and getting it to throw its beams straight ahead instead of off to one side, as is often the case. To adjust the light to show straight ahead it is necessary to have the engine on a perfectly long, straight, low piece of track before commencing to make the necessary adjustments to accomplish this object. Here is an opportunity for some genius to invent a simple and efficient adjusting apparatus whereby the engineer may adjust the light while running on a straight piece of track without leaving the cab. Once the light is adjusted it may be fixed securely in that position, and no further annoyance need be had on account of light showing off in the lots instead of on the track, where it belongs. The other improvement would be to have the carbons made so as to last twelve or fourteen hours, instead of from eight to ten hours.

"At all water-tank stops all of the time allotted for taking water can be used to advantage by the engineer in oiling around and inspecting the journals and machinery of the engine as this work should be done without the necessity for using a portion of it in renewing carbons in the headlight."

Conducting Transportation

Lending Cars Like Lending Money

Railway Age, Nov. 8, 1901, p. 534.

President S. Fish, of the Illinois Central, writes as follows to the *Age*: The practice at present existing among the railways of the United States of freely lending their freight car equipment to each other upon the basis of the original borrower, and each successive borrower from him, finally accounting to the owner for the use of the car upon the borrower's statement of the mileage made, is to my thinking wrong in every respect, and it is only necessary to substitute the terms used in the banking business to show how wrong it is. Would any banker lend $500, the assumed value of a freight car, upon the following conditions: That the borrower and those to whom he may lend the $500 shall return the money when he or they may be ready, at such place and time as suits their convenience, and pay the banker in accordance with their statement of the benefit which they have derived from the use of the banker's $500? The mere statement of the proposition in terms used in banking seems to me to illustrate the absurdity of the present method.

To sum up the whole question, a freight car has a certain definite value, and if loaned at all should be loaned precisely as money is loaned and land leased—that is, for an agreed payment as to so much per annum, or so much per diem, in accordance with the length of the term for which the thing loaned is out of the hands of the owner.

An Argument Against Per Diem

Railway Age, Nov. 8, 1901, p. 534.

Mr. W. M. Legg, train master of the Georgia Southern and Florida, writes to the *Age*. He says there is no more reason for the making of rates for the settlement for the use of cars on a "time basis," than there is for the fixing of freight rates for the shipments, or freight carried in the cars; hence the use of cars is essentially a mileage question. Suppose one fixed freight and passenger rates on a basis of time in transit, how would it work? The writer contends that the per diem system will not prevent detention and give free use of cars, as no set of intelligent railway managers will agree upon any per diem charge for the use of a car for more than it is worth in the conducting of transportation; therefore, instead of preventing, it would rather license detention, because the road would feel that the car was hired, and would operate it at a per diem rate until repairs were necessary. This is a dangerous position for car owners from any view point, inasmuch as no just provision could be made for collection and settlement on joint tracks, private sidings, repair tracks, awaiting data for forwarding, etc. Who is going to pay per diem on a car which A hauls to destination and delivers to B for delivery on a private track, the owner of which would be allowed by the laws of his State three days to unload?

The following suggestions are made. Let mileage continue to prevail as the basis for settlement. Provide a uniform system of per diem car detention demurrage rules and rates supplementing tariffs for car demurrage settlements with respect to car ownership. Stop the reconsignment of cars, unless demurrage is assessed as advance charges. Stop milling in transit rates, unless detention is provided for. Provide for demurr-

age for detention on private sidings in accordance with a fixed time to be allowed for loading or unloading, and settle with respect to car owner.

The whole thing, in a word, is to provide demurrage tariffs so that whoever owns the car will participate in what it earns and let the rate be in excess of the ordinary warehouse rent, so that warehouses will take the place in business that they formerly did, and let cars resume their places as vehicles of transportation.

Causes of "Break-in-Twos."

Railroad Gazette, Nov. 15, 1901, p. 787.

We are getting nowadays from the Nashville, Chattanooga and St. Louis a good deal of statistical information which can, after a while, be grouped and generalized into some valuable conclusions. As the reader is well aware that company does the best work in watching and repairing its freight car air-brakes that is done in this country. Below is a little table which the general manager has sent giving the causes of train parting for the year, including July, 1901. His original table gives the figures month by month, but the totals will doubtless serve the purpose of the student of this question quite as well as the monthly reports.

Train Parted Report, Year Ending July, 1901.

Draft timbers pulled out	87
Draw-bar broke in shank	96
" " top knuckle lug	56
" " through head	21
" " bottom knuckle lug	3
Knuckle broke	189
" opened	73
" pin broke	7
" lock pin broke	12
M. C. B. couplers parted	77
Key broke, continuous draw-bar	59
Slip pin key broke	20
" " key lost	23
" " broke	78
" " head pulled through end draw-bar	6
Yoke strap gave way	5
Yoke bolts broke	3
Link broke	2
Total	817

The Car Famine

Iron Age, Nov. 14, 1901, p. 1.

That the iron industry is not the only one suffering from an inadequate railroad equipment to meet the exigencies of the hour is evident from the trade reports with which the press is teeming. No better illustration of the sympathetic relation existing between various industries could be offered than the present picture of the business situation.

In some quarters there has been a disposition to hold the transportation companies entirely responsible for the lack of an ample supply of rolling stock to move all freight offered expeditiously. That this is manifestly unjust only a clear insight into conditions existing and a calm consideration of the facts are necessary to prove. Every business man, every manufacturer, knows that there are tides of ebb and flow in industrial channels; periods when the trade winds blow west, then east; seasons of feast and seasons of famine in order.

So it is with the railroads. There are times during the year when the tonnage offered calls for the employment of every available car and locomotive with which the transportation companies are equipped; rolling stock which has been discarded even is sometimes pressed into service during the emergency. Then comes the waning period, and later, not a few idle cars are on sidings, housed or in repair shops. It would require superhuman knowledge to forecast and provide against all emergencies which may arise during the prevalence of abnormal conditions; and the present is one of those times.

This year, and at this time, the railroads are called upon to transport not only cotton in the South and grain in the West, held back for more favorable markets in the height of the crop marketing season, but are simultaneously offered a heavier tonnage of general merchandise than for many years. All this comes, too, at a period when industrial plants are making a strenuous effort to secure a larger supply of fuel and raw material to provide against delays and drawbacks incidental to the winter season. This occurs ordinarily at this time, but this year, with the stimulus referred to, the melting of mills and foundries have been unusually heavy and furnaces have been blowing to the limit of capacity, and they have made extraordinary demands upon the railroads.

Overworked Train Men

Railway and Locomotive Engineering, Nov., 1901, p. 483.

Since millions of dollars have been expended on safety signal devices, vestibules, electric headlights and new methods of moving trains, it has been found that accidents are still happening, and the record shows that in the past two years two-thirds of the accidents that have occurred on the big roads were due to overworking the men. The man on the engine is a very important factor, but this is forgotten, and where the engine will not stand a long run it is cut off and the engineer, who is supposed to be invulnerable, is sent on through. The long, wearisome strain of course tells and old engineers are being dropped one at a time, either by official order or by death, and new men are being taken on who have energy but lack experience. Consequently, terrible accidents are happening every week, due to an old man being worn out or a young man being careless. If it could be only hammered into the heads of officials that a locomotive cannot be run with a slot machine at the throttle there would be fewer derailments and collisions. There was a case recently that justifies comment. An old and faithful engineer was suspended for sixty days for carrying a friend on his engine. The superintendent who suspended the old man put a young man on his run and the young man forgot his orders, pulled out in front of a fast freight, and the result was eleven persons killed, ten injured and the company salted for $70,000 damages.

The Train Staff System

Railway and Engineering Review, Nov. 2, 1901, p. 704.

This system is to control the traffic on single track railroads, and is an English production, and until the last ten years its use was confined to Great Britain and her colonies. In 1889 Mr. Webb, the chief mechanical engineer, and Mr. Thompson, the signal superintendent of the London and North Western Railway, designed and introduced the Webb & Thompson train staff system. The system is similar to the Tyler tablet system, in that it is electrically controlled. The Webb & Thompson train staff system was introduced into the United States by the Johnson Railroad Signal Co., in 1893.

A section of single track may be controlled by the high-speed staff system. Two instruments are required, one at each end of the section. They resemble two grandfather's clocks, the "dial," however, being perforated with a number of holes for the "staffs." By appropriate mechanism each station can call the other. If A station calls B, B answers, and if we may so say, gives "mechanical consent," indicated on a dial, for A to withdraw a staff which is to be carried by train from A to B. The staff being out, and indication being given in the act of removal, no other staff can be withdrawn from either station until the loose staff has been put in station B. If train from A to B is canceled, after a staff has been withdrawn at A, it may be again returned to instrument at A, which will be indicated at B, and both instruments will be in the normal state again. The principle of the system is that two staffs cannot be taken out at the same time, nor can they be withdrawn consecutively. The removal of one staff locks both instruments against further *removals*, but either instrument remains open to *receive* the staff which has been taken out. Engines running over the section controlled by this system are provided with mechanism for picking up a staff after it has been withdrawn, and of delivering it at the other end of the section without stopping; but this is rather an adjunct to and not a part of the staff system. Signals are also operated by the pick-up and delivery devices, which indicate accurately the state of affairs.

A special form of instrument has also been devised, for use at a siding at some point between stations A and B. If a train with staff reaches the intermediate siding X, the staff carried by it is used in unlocking the switch, the train pulls in on the siding, if time limit, or other reason dictates this course,

the switch being locked, the staff is placed in the siding instrument, and the instruments at A and B are synchronized so that trains may be sent from A to B, or from B to A. When these have passed through the sections and staffs have been placed in instruments at A or B, this causes the release of the staff at the siding, which on being removed, changes the circuits so that a staff cannot be released either at A or B until staff of the train from X has been deposited in one or other of the terminal instruments. The Chesapeake and Ohio; Cincinnati, New Orleans and Texas Pacific; Atchison, Topeka and Santa Fe; Chicago, Rock Island and Pacific; Gulf, Colorado and Santa Fe; Philadelphia and Reading, and the Canadian Pacific Railways use this system on parts of their lines.

Medical and Surgical Matters

Color Blindness Common

The defect of vision commonly known as "color blindness" has recently been carefully studied, and various interesting facts discovered in regard to it. Apparently there is every degree of color blindness; there are persons who are unable to distinguish any color whatsoever, though the number of these is small; there are others who confuse certain bright colors; while a smaller section of mankind hesitate only in recognizing delicate shades. The two colors which are most generally confused are red and green, while color-blind people very rarely fail to separate yellow and blue. Another interesting point has been established from careful observation made in Europe and the United States, and while only 5 per cent. of the women of these countries are color-blind, the proportion of men who are so affected is no less than 4 per cent.—Newcastle (Eng.) *Chronicle*.

Separate Cars for Consumptives

Railroad Gazette, Nov. 15, 1901, p. 793.

The demand that persons sick with tuberculosis of the lungs shall, when traveling on railroads, be separated from the other passengers, is again being agitated in the West, and the Transcontinental Passenger Association had it up for formal discussion at a recent meeting in St. Louis. A complaint is being presented to the railroads by the Travelers' Protective Association, an organization of traveling salesmen. This danger, or affliction, is most serious in the regions west of the Missouri River, Colorado, New Mexico and Arizona being full of resorts for this class of invalids.

The demand for more rigid hygienic measures on passenger trains is one in which everybody should feel a deep interest for the ravages of this disease are familiar and the dangers of contagion have been explained in all sorts of publications. It is obviously unscientific for passengers who are well to ride for hours in the same car with a consumptive patient, for that means the constant danger of spreading this most destructive disease. For this practice to go unchecked is a defect in our civilization. But the remedy is not easy.

That railroad cars can be very effectually fumigated and otherwise cleansed is evident from what has been done in the Southern States during epidemics of yellow fever. The Pullman Company has been credited with carrying out very thorough and scientific regulations in the south, and, indeed, on all its lines.

Trouble arises, however, when we come to administration. But very few consumptives will ride on any train, and many trains have none at all. Even in Colorado and New Mexico the sick travel very irregularly. Where does the consumptive passenger get on? Can a railroad reasonably keep a separate car standing at the station, even in a big city, waiting for individuals of such a small class? Can it run a compartment on every train, or even on one train a day, when it will probably be empty nearly all of the time?

But expense and inconvenience do not constitute the main argument. If money and trouble were the only costs, the railroads might perhaps bear them. At all events, the Legislatures would have no hesitation in ordering them to do so. The question how to control the passengers would be the great difficulty. Who shall decide what passengers are sick? Having decided that a passenger should be put in the consumptives' car, how will you make him agree to be put there? Where should passengers be inspected? Before they enter the cars? If not, the protection would be only partial.

As a further element in the discussion, and one which has thus far had little if any expression, we append three interviews which we find in the Philadelphia *Times* of recent date:

Dr. Lawrence F. Flick, president of the Free Hospital for Consumptives, in speaking about the transmission of consumption in cars and the prevention of contamination from this source said:

"Some provision might be made against the spread of disease from sleeping-car sputum, but a very good provision would be to cleanse and properly fumigate sleeping cars after they had been used. I think that is being done on some railroads.

"The fact is, for the implantation of tuberculosis a prolonged intimate exposure is necessary, and such exposure that could take place in a car—even a sleeping car—would be insufficient in the majority of cases to produce an implantation of the disease.

"Now, if the intimate exposure to which those who are in constant contact with tuberculosis would only produce an implantation about one in five cases, it is not likely that a brief exposure of a single night in circumstances under which contamination cannot be very intense should frequently cause an implantation.

"I heartily indorse every movement which can shut out the possibility of implanting a single case of the disease, provided such movement does not inflict undue hardship on those so severely afflicted."

Dr. Thomas J. Mays said that the movement was conceived in a gross misconception of the nature of the tuberculosis germ and its contamination.

"The whole idea," said Dr. Mays, "is absurd and ridiculous. You might as well have separate compartments in street cars, separate pavements for the diseased to walk on and certain streets for them to live in. The idea is based on an assumption without a scientific basis. The proper thing to do is to first find out whether consumption is ever implanted from steam cars. So far as I know the disease has never been transmitted from the sick to the well in cars."

Dr. T. M. Tyson, head physician of the Rush Hospital for Consumptives, said:

"The movement in addition to being impracticable, as far as the railroads and the traveling public are concerned, is certainly not necessary. The danger from spreading consumption from this source is so far removed that the discussion hardly deserves the consideration of the physicians when so many other contaminated sources, more dangerous, are permitted to go unnoticed. Prolonged exposure to the germs is necessary and the exposure in the cars is of so brief a period as to be of practically no effect."

English Ambulance Competitions

Transport (London), Nov. 8, 1901, p. 384.

The first annual competition amongst the employés of the Cambrian Railway has just taken place. The trophy carried off by the winning team was a silver challenge shield presented by two ladies. Invitations were issued to the principal officers of the company, their wives and to all members of the various ambulance classes on the Cambrian system, with their wives and lady friends. Employés of the railway were admitted free, outsiders being charged 6d. entrance, the proceeds so obtained being devoted to the funds of the Ambulance Association. The challenge shield is placed in the board room of the company at Oswestry, and is there for inspection. Mr. W. H. Gough, superintendent of the line, provided a medal for each member of the winning team as a permanent memento of the victory.

In the Caledonian Railway ambulance competition in Glascow, sixteen teams participated. The general officers were well represented among the onlookers. The result proved the Hamilton West team to be the winners of the challenge cup, which is tenable for one year, and carries with it gold badges for each member.

The second place, with silver badges for each member, was gained by Motherwell; while Buchanan Street (Goods) team took third place. Mr. W. H. Blackstock, of the general manager's offices, carried out the arrangements.

Mr. Meldrum, general manager of the Cheshire Lines Railway, recently presented medals and certificates to the Warring-

ton Central Station Ambulance Corps. In his speech the general manager alluded to the great importance of railway men being able to render first aid in case of accident, and congratulated the Warrington staff on being at the head of the Cheshire Lines Corps. He said it was not a rare occurrence for persons who had met with an accident in the streets of Liverpool, near the station, to be treated first of all by the railway ambulance men. He gave an incident of a bareheaded, ragged little urchin, who had been run over and his foot crushed by a conveyance. First Aid was rendered to him by station men, and the poor lad was soon able to depart for home.

First Aid Challenge Shield

Railway Surgeon, Nov., 1901, p. 171.

The British railway ambulance challenge shield is made of oxidized silver, bearing in the center a burnished Maltese cross, embellished alternately in gold at each of the principal angles with a lion and a unicorn, being the badge of St. John. Above the cross are depicted in repoussé work, the Good Samaritan, St. John's Gate, and a railway ambulance scene. Below are sprigs of St. John's wort, with scrolls entwined, bearing respectively the legends, "First Aid to the Injured," and "Railway Competition;" also a plate inscribed, "St. John Ambulance Association, being the ambulance department of the Grand Priory of the Order of the Hospital of St. John of Jerusalem in England. Presented for annual competition in commeration of the longest reign in English history to encourage ambulance work on railways, 6th May, 1897." The shield is surrounded by a border of St. John's wort, and is mounted on an oak plinth, on which are bosses on Maltese crosses, to be engraved with the names of the winning railways. The whole is surmounted by a modeled figure of Mercury, symbolic of modern railway speed.

Fourteen English and Welsh railway companies entered teams, five being selected for final competition for the first competition in 1897. The contest took place in the Crystal Palace in London, the Great Eastern Railway being first. The other four stood in the following order—North London Railway, London and North Western Railway, London, Chatham and Dover Railway, and the Liverpool Overhead Railway. The Princess Christian of Schleswig-Holstein presented it to the G. E. Railway team, who held it for the first year.

Apparently Fatal Electric Shock

N. Y. World, Nov. 24, 1901, p. 6.

Dr. Andre Broca, one of the foremost physicians of France, a professor in the Paris School of Medicine, and the author of a number of books which are authorities among scientists, says concerning the accident which befell him, "On the day in question we were making various trials in regard to currents of high frequency. My mind became absorbed and I inadvertently seized two electrodes in my hands. I was thrown down with great violence by a general muscular tetanus, including such a stiff lockjaw that my jaw-bones and muscles hurt me two days afterward. I had had time to make a great but useless effort to let go the electrodes. On the floor I must have been conscious during at least two seconds, for I distinctly remember physical pain and mental anguish. The current which went through me was the secondary of a Ruhmkorff apparatus excited by the alternated current of the city of Paris, which is 42 periods by second and 110 volts. At the time of the accident the primary was giving 50 amperes. The potential difference, therefore, was about 50,000 volts for the open circuit. If the circuit had been completely closed, its total resistance being about 70,000 ohms, and admitting the coefficient of product to be 75 per cent., we would have an intensity of about 300 milliamperes.

"But in the circuit there was a deflagrator. Consequently I cannot say what were exactly the conditions.

"One thing more to be considered is that the shape of the electrical waves in my case was sharper and much more murderous than those passing through the men in the electrocution chair. My assistant thinks the current acted on me four or five seconds only."

To Check Typhoid

Railway and Engineering Review, Nov. 2, 1901, p. 703.

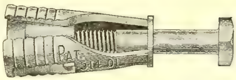
Despatches from Berlin state that unique precautions are about to be inaugurated by the Prussian State Railway authorities to prevent the spread of typhoid fever. Practically every station will be turned into a quarantine, and every station master made a health officer. In addition to orders to maintain scrupulous cleanliness throughout the depot premises, the station masters are instructed to furnish a detailed report of any typhoid cases in their towns, or any symptoms of possible cases to the physician, who will, henceforth, accompany every through train. If fever conditions are found to exist, the station master must furnish freshly boiled water for the use of passengers, and the train crews. He must also maintain tanks of sterilized water, conspicuously marked for the use of the traveling public. The regular stationary drinking fountains must be sealed up until the town has been declared free from fever. The medical authorities who have framed these new regulations assert that railway travelers and railway coaches are among the most prolific disseminators of contagion.

Miscellaneous.

The Brohard Expansion Bolt

Iron Age, Nov. 14, 1901, p. 16.

The Brohard Company, Philadelphia, Pa., are placing on the market a new expansion bolt, illustrated herewith. The device is manufactured of malleable iron and is designed particularly to provide a bolt, having an expansion cover, capable of easy insertion and removal from fixed positions in the wall or other place where it is to be used and which will remain in that fixed position. The parts of the expansion bolt are few, and are so arranged that they cannot become detached from



each other. The driving head or spreader is cone shaped and is in contact along its whole length with the expanding sections of the sleeve. It is held in position by means of suitable lugs or ribs, which are dovetailed into the slotted sides of the expansion case, making it impossible to force the spreader or drawing head from the case. The company are now prepared to furnish these bolts in sizes ¼ to 1 inch diameter, and from 1¾ to 12 inches in length, larger and special sizes being made according to order and specifications.

"Water-Hammer" in Steam Pipes

Engineering (London), Nov. 8, 1901, p. 668.

Mr. C. E. Stromeyer recently read a paper on Explosions of Steam Pipes due to Water-Hammer, at a meeting of the Manchester Literary and Philosophical Society. He first investigated the pressure which is set up when an elastic body suddenly comes to rest, the solution of which problem was correctly guessed at by Dr. A. Ritter in 1899, but he was unable to give proof of the possibility of discontinuity of motion, which is part of the phenomena of an elastic blow. This point was fully gone into by Mr. Stromeyer, and also illustrated by

means of an unloaded helical spring. Having established this theory it was easy to see that when an elastic prismatic body is moving axially, its front surface comes to rest instantaneously on contact with an unmovable obstacle, while the more distant parts, come to rest also instantaneously when the wave of pressure or of change of velocity reaches them. This wave travels with the velocity of sound, and as the tail end of the bar has maintained its velocity, it is quite clear that the axial pressure in the bar is the product of the elasticity of the material into the ratio of the velocity of the object to the velocity of sound. With the help of this theory it was easy to calculate the pressure which a plug of water of a given length, travelling a given distance under the influence of a given pressure, will exert if brought to a full stop. This was illustrated at the meeting, by the bursting of two glass tubes by means of water-hammer. An experiment was made showing how violent are the concussions set up even in a small glass tube if the water which was originally contained therein was drained off while under steam pressure.

Recent Practice in Freight Train Braking

Engineering News, July 4, 1901, p. 8.

Statistics recently made public by the American Railway Association show that on Jan. 1, 1901, the railways which are members of that association had 989,127 cars equipped with air brakes and 54,118 new cars under contract to be so equipped. This represents an investment of not less than fifty to sixty million dollars. The passing of the Federal Safety Appliance law in 1893, undoubtedly hastened this increase. Though it did not require all cars should be equipped with brakes, it required that freight trains operated after a given date must have a sufficient number of air-brake cars to control the train. There are still about 375,000 freight cars without air brakes. However, the equipment of freight cars with air brakes will eventually be made complete. All new cars put under contract since 1897 have had air brakes applied. The complete equipment with air brakes is only a matter of a few years. It is common practice now to bunch the air brake cars next the engine in making up trains. This makes a great expense for switching movements, so that it is practical economy for the railroads to eliminate the non-airbraked cars. In general, the roads operating over steep grades, use brakes on every car, while those on level districts use only a part of the brakes. This is really on account of partial equipment, and when all cars have brakes it will be customary to use all brakes on all cars. The best way to facilitate the use of air brakes on long trains is to keep the brake apparatus in such good condition that leakage from it will be trifling.

The Iron and Steel Industries of Sweden

Cassier's Magazine, Nov., 1901, p. 3.

Mr. Robert W. Hunt gives the result of observations made in 1899 while on a visit to that country as one of a number of Iron and Steel Institute members.

In 1855 Bessemer startled the world with his invention, but it was soon discovered that experiment and practical commercial operation could be very different things. In Sweden G. F. Goransson improved the Bessemer system by increasing the size of the orifices in the tuyeres, thus augmenting the volume of blast. By this means he shortened the process enough to produce sufficient heat in the converter to successfully accomplish the end sought. Goransson's success gave fresh courage to Bessemer and his friends. The great English steel-maker would no doubt sooner or later have solved the problem himself. Nevertheless the writer thinks that Bessemer never made proper acknowledgment to Mushet for his recarbonizer invention, and never made any to Goransson.

Mr. Hunt visited a number of mines and steel works. The Domnarfrot Steel Works belong to the Stora-Kopperbergs Co., the largest iron and steel producing concern in Sweden; they probably have the largest charcoal iron works in the world. The plant now consists of 6 ore-roasting kilns, 5 blast furnaces, 2 Bessemer acid converters, 3 basic converters, 4 Siemens-Martin open hearth acid furnaces, and 9 rolling mills of various sizes. The annual output of the blast furnaces averages 43,000 tons.

The Hofors Steel Works has a water conduit about twelve miles long. The power house contains six turbines, and the total power transmitted to the plant amounts to 1,400 horsepower. The Hofors works comprise 2 blast furnaces, 2 Bessemer converters, 1 open hearth furnace, 1 blooming mill and 1 wire mill.

The Sandvik Steel Works were established in 1862 and are in the writer's opinion, the most modern of any to be found in Sweden. This establishment made their original success in the manufacture of locomotive tires; to-day their most remunerative line is weldless tubing. The production amounts to 20,000 tons of steel per year. The company has built four schools. There is a hospital in which the men have medical attendance, free.

The Dannemora mines in Sweden contain the purest iron ore commercially known to man. The company operating it is a close corporation, and the ore is sold to no one outside it. The owners all possess iron and steel producing plants, and obtain from these mines, part of their supplies. They limit the output to 50,000 tons per annum and place it at a price which might seem prohibitory, but from its quality they can afford to so charge themselves.

Some Notable British Trains

Windsor Magazine (London), July, 1901, p. 157.

Mr. Herbert Russell has written an article on the notable trains of England, which is not only interesting to the general reader, but also contains details that may be useful to the American railroad man. While the author admits that the British do not actually travel very much faster than their grandfathers, he gives speed records which are valuable for the purposes of comparison.

One of the oldest regular expresses in the Kingdom, the "Flying Dutchman," on the Great Western Railway, used to run from London to Swindon, some seventy-eight miles, in an hour and twenty-seven minutes. Such time would now place it in the second class category of fast long-run express trains. The South Wales Express from Paddington to Bath, 109 miles, covers the distance in two hours, at a speed of 53 1-2 miles an hour. This includes starting, stopping and checking. Hence it is clear that at times a speed of seventy miles an hour is obtained. The "Night Scotchman" on the London and North Western covers the 158 miles from Euston to Crewe in three hours and five minutes. The Great Western's Newquay Express, known as the "Cornishman," runs from London to Exeter, 194 miles, in three hours and three-quarters. This train is made up of six thirty-ton coaches. The Caledonian Railway Company's Tourist Express, called "The Aberdeen Flyer," leaves Carlisle and, making four stops, arrives, after its run of 241 miles, at Aberdeen in 298 minutes. When it is considered that the road is a very difficult one, with long and steep gradients, the run is indeed most meritorious. The London and North Western Company's Irish Mail, dubbed "The Wild Irishman," is a very fast train, but the Irish Night Express goes it one better, covering the distance from Euston to Holyhead, 264 miles, in five hours and a quarter.

The London and Southwestern Railway runs a fast train called the "Eagle," from London to Plymouth, which carries the American mail for New York steamers.

The Great Southern and Western Railway of Ireland makes some fast runs. The 166 miles between Kingsbridge and Cork is run in three hours and forty-one minutes, an average of 45 miles an hour. The Killarney Express runs from Dublin to Mallow, 145 miles, including stops for water, in two hours and forty-five minutes, an average of 51 miles an hour, a most creditable performance. Other figures are given, which are most pertinent at present, owing to the late controversy over the relative merits of British and American engines.

[The article is illustrated by thirteen half tones among which is one engine of the Atlantic type 4-4-2; one 0-6-0, five of the 4-4-0, and six of the 4-2-2 type, among which class of "singles" are the famous "Red racers of the Midland."—EDS. RAILROAD DIGEST.]

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D. C., and 727 Walnut Street, Philadelphia, Pa.

A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

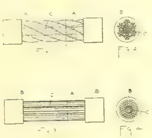
Flexible Stay Bolt

No. 662,071.

GEORGE ROBERT JOUGHINS, of Moncton, New Brunswick, Canada.

My invention relates to what are known as "stay-bolts" or "screw stay-bolts," which are generally used in boilers to stay the flat surfaces thereof and so enable them to sustain the boiler-pressure bearing upon them. Such bolts are the only practicable means at present known for sustaining large flat surfaces, such as the sides of fire-boxes of locomotives and the flat parts of other boilers.

My invention is intended to materially increase the durability of such bolts by making them partially flexible, and thereby enabling them to be bent to a comparatively large degree to and fro without injury. To obtain such flexibility combined with the strength necessary, I propose to make a bolt of numerous pieces of metal assembled together, so as to form approximately a wire rope, and which would tie the two flat surfaces together.



It seems apparent that if a piece of wire rope could be used to stay flat surfaces together it would have all the strength and flexibility desired, and would therefore probably be an ideal stay-bolt.

My invention furnishes the means for accomplishing the above objects, and thus makes it possible to use a stay-bolt made up of numerous strands or pieces laid side by side lengthwise of the bolt. It is evident that the pieces may be of any suitable section, round or square, or any other form, and of such a size as to give the necessary flexibility. They may be plaited together into the form of a rope or be laid parallel or in any other shape, so as to produce a bolt having the pieces or strands extending to or through the plates or to the pieces which are screwed into the plates, which are to be stayed together.

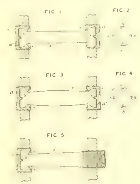
To make a bolt, say, of one inch in diameter, I would take a piece of three-eighths-inch round iron of a suitable length, place upon it at each end a ferrule, and around both iron and ferrules a bundle of wires, each about one-eighth of an inch in diameter, then over the wires at each end another ferrule, and then weld together the parts composing each end, thus forming a solid knob, which would then be machined down to the proper size and threaded. Another way would be to have a rope or strands made up with a large core of metal. Then by cutting off pieces of suitable length and electrically welding them unto suitable pieces of metal, we quickly produce a practicable stay-bolt.

Stay for Fire-Boxes in Locomotive, Marine, or Other Boilers

No. 686,958.

FREDERICK WILLIAM STROUDLEY, of Didsbury, near Manchester, England.

The objects of my invention are to avoid leakage caused by contraction and expansion and the destruction of the ends of the stays when exposed to the intense heat of the fire.



An improved flexible stay-bolt for steam-boilers, consisting of a bolt having an enlarged head, an externally-threaded socket enveloping the head, and means connecting the socket and the head to lock them from turning independently.

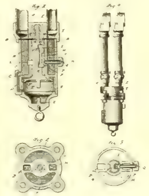
Means for Testing Air Brakes

No. 602,009.

G. S. HODGINS, of Windsor, Ontario, Canada.

The objects of my invention are, first, to enable the engineer at all times to ascertain the condition of the brake system and also of the signal system throughout the entire length of a train; second, to inform the engineer when the brake in either "service" or "emergency" applications is applied to the last car of a train.

The information that the brake has been applied to the rear car of the train in service or emergency applications is imparted to the engineer by almost the identical method employed in testing, the only difference being that in the former case more air is allowed to escape from the engineer's valve, sufficient to bring into action the triple valves in systems which employ such valves, while in testing the pressure is not enough reduced in the train-pipe to apply the brakes.



The combination with two fluid-pressure pipe-lines on a railway-train, one of them being an air-brake pipe-line, and a signal, of testing mechanism operatively connected thereto, such mechanism being arranged to operate by a variation of fluid-pressure in one pipe to vary the fluid-pressure in the other, and thereby operate the signal; substantially as described.

The combination with two fluid-pressure pipe-lines, means for varying the pressure at one end of said pipe-lines, and a signal, of testing mechanism operatively connected thereto, such mechanism being arranged to operate by a variation of fluid-pressure in one pipe to vary the fluid-pressure in the other, and thereby operate the signal; substantially as described.

The apparatus for testing the air-brake and signal systems, consisting of the following elements in combination, to wit: a train-pipe; a signal-pipe; a proving pipe; a proving-valve; means for discharging air from the train-pipe; and a signal; in substance as set forth.

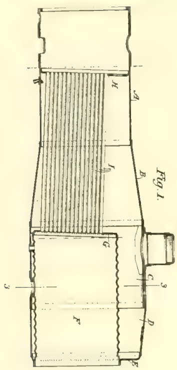
A proving-valve having fluid-pressure pipe-couplings, one of which communicates with a chamber in a valve-casing, a piston in said chamber, and said piston controlling an opening from a second chamber which communicates with the other pipe-coupling.

Locomotive-Boiler

No. 682,437.

CORNELIUS VANDERBILT, of New York, N. Y.

This invention relates to locomotive boilers of the general type of that shown and described in letters patent of the United States No. 637,186, dated November 14, 1899; and the object of the invention is to further improve the con-



struction of boilers of the type shown in said letters patent, and particularly to avoid the danger of leakage at the joints of the boiler-shell occasioned by unequal expansion and contraction of the parts, while avoiding unnecessary weight, saving valuable space in the cab, and retaining desirable generating surface and steam space. To attain these desirable results in one structure, the main fire-box section, the forward or barrel section, and the middle conical section are arranged symmetrically with respect to the common axis, and the rear portion of the fire-box section is reduced or tapered to a head which is of larger diameter than the cylindrical fire-box, and, furthermore, the flue-sheet is inclined from the vertical, so that it shall stand at right angles to the inclined tubes.

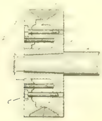
A locomotive boiler having a cylindrical forward section, a truncated conical middle section and a cylindrical fire-box section all symmetrically disposed with relation to the common axis.

Piston

No. 685,015.

SAMUEL K. TODD, of Cayuga, Ind.

In a piston, the combination, with a body portion provided with a cone near its periphery and a central hub, of a follower portion also provided with a cone near its periphery and slidable on the said hub leaving the end thereof uncovered, a packing-ring seated on the said cones, and means for adjusting and locking the said follower portion independent of the piston-rod.



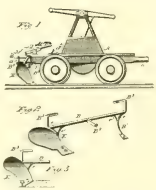
In a piston, the combination, with a body portion provided with a cone near its periphery, a flange projecting from the smaller end of the cone, and a central hub; of a follower portion also provided with a cone near its periphery which slides upon the said flange, said follower being slidable on the said hub, a packing-ring seated on the said cones, a piston-rod secured to the said hub independent of the follower portion and means for adjusting and locking the said follower portion independent of the piston-rod.

Railroad-Track Cleaner of Flanger

No. 685,425.

EMIL J. MARTIN, of Madison Lake, and BENJAMIN F. EMERSON, of Rochester, Minnesota.

This invention relates to certain new and useful improvements in track-cleaners of that type which are usually designated as "flangers," the object of this invention being to provide a cheap, simple, and effective means for attaching the



plows or flanges to a hand-car so that they may be raised or lowered and when in either position will be limited as to their movement by reason of the plow-carrying frame engaging or abutting against the means used for attaching the carrying-frame to the projecting end of the hand-car, as will be hereinafter more fully set forth.

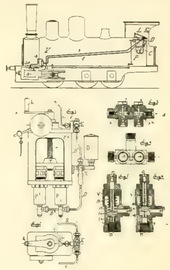
In a track-flanger, the combination with a hand-car having projecting side bars, of a rock-shaft connected to the ends of the side bars by clips, the rock-shaft having inwardly-projecting ends which overlie the ends of the side bars to limit the movement of the rock-shaft by engagement with the clips.

Means for Lubricating Pistons and Slides of Locomotives

No. 686,788.

FRANZ WAGNER, of Nuremberg, Germany.

In a central lubricating apparatus for locomotives, the combination of a reservoir, D, a double spraying device, E, distributing-valves, double forced-feed cylinders P, P,. a three-way cock by which the cylinders P P can be connected either



with the reservoir D or the double spraying device E, the said distributing-valves being arranged in proximity to the steam-cylinders, said distributing-valves being connected by pipe-conduits with the spraying apparatus and with the slide-valve casing and cylinder.

In a central lubricating apparatus, the spraying device, a double-acting distributing-valve, the chamber of which communicates by means of a lateral port 13, with the spraying device and by ports 11 and 12, with the slide and the cylinder-chamber respectively, and said valve being provided with a piston 16 and two conical seats 14 and 15 in such a manner that the valve, when the locomotive runs under steam, is pressed by the steam admitted through the lower port 11 upon its upper seat and allows the lubricant to reach the slide, while, when running without steam, the valve is pressed upon its lower seat and the lubricant is conducted through the port 12, leading to the steam-cylinder.

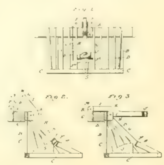
Draw-Bar

No. 685,272.

FRANK L. GRANGER, of Sioux City, Iowa.

In a draw-bar for a locomotive-pilot, adapted to be pivoted to the front beam of a locomotive, an upwardly and rearwardly extending portion, a lug at the end thereof, a hole therein, and a socket on the rear of the beam and a hole therein to register with the hole in said lug.

In a draw-bar for a locomotive-pilot adapted to be pivoted to the front beam of a locomotive, an upwardly and rearwardly extending portion, forming a shoulder, and a depending lug at the rear end of the draw-bar, a socket on the rear of said front beam and means for fastening said depending lug in said socket.

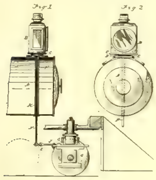


Locomotive-Headlight

No. 685,605.

JOHN STANLEY HENDERSON, of Nashville, Tennessee.

The combination, with a locomotive headlight and truck both adapted to rotate as described, of a vertical shaft connected with the headlight and passing through the front end of the boiler, and



a lever connecting the lower end of said shaft with the truck.

The combination, with a locomotive-boiler, a pivoted headlight and truck, and means connected therewith for transmitting rotary motion as specified, of a vertical shaft or rod rigidly connected with said means, and having a central portion which is detachable.

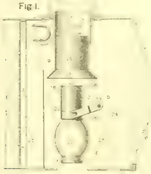
Exhaust Mechanism for Locomotives

No. 685,277.

RUSSELL HARDING, of St. Louis, Missouri.

The object of my invention is to so construct an exhaust apparatus for locomotives that the draft can be regulated so as to be substantially uniform during the variations in pressure of the exhaust-steam caused by the change of the point at which the steam is cut off in the cylinders.

Still another object of my invention is to prevent the accumulation of coke and



cinders in the smoke-box of a locomotive, so that the lower flues of the boiler will not be obstructed and rendered useless.

The combination with the smoke-box of a locomotive, of a smoke-stack leading therefrom, a petticoat-pipe extending into said smoke-stack and having a flared lower end, an exhaust-nozzle in said smoke-box, an extension for said exhaust-nozzle terminating below the lower end of said petticoat-pipe, and means for raising and lowering said extension.

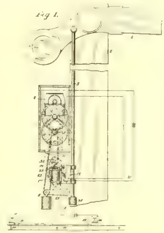
Signal

No. 684,968.

JOSEPH A. WILSON, of Chicago, Illinois, assignor to the Hall Signal Company, a corporation of Maine.

The invention resides in the means and in the arrangement thereof for operating and controlling the movement of the semaphore of the signal. This semaphore may be of any desired variety. I contemplate especially, however, the employment of a semaphore-blade, such as is generally used in exposed-position signals.

In a railway-signal, the combination of a semaphore biased to stand normally at "danger;" an operating-belt for the semaphore; a clutch connected to move with the semaphore adapted to unite and disunite the semaphore and belt; a motor for driving the belt to shift the



semaphore from danger to safety position; means controlled by a train in the rear of the signal for operating the clutch to unite the semaphore and belt and for driving the motor to shift the signal to "safety;" and means controlled by a train in advance of the signal for releasing the clutch to permit the clutch and semaphore to return to normal position.

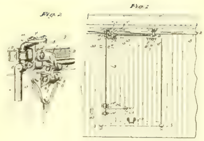
In a railway-signal, the combination of a semaphore; an electric motor; a belt driven thereby for operating the semaphore; a clutch arranged to move with the actuating-rod of the semaphore for uniting and disuniting the semaphore and belt; contact-points in the circuit of the motor carried on said rod; magnetic means carried on said rod for controlling said clutch and said contact-points; and circuits controlled by a train for influencing said magnetic means.

Car-Door

No. 685,379.

SINCLAIR J. JOHNSON, of Nutley, New Jersey.

This invention relates to doors, and more particularly to that class thereof designated as "freight-car" doors; and it especially relates to improved means for shifting the door into position, whereby it can be moved away from the doorway, the object of the invention being to provide an improved organization of mechanism by means of which a door flush with the door-casing can be shifted



into position with facility and with comparatively little labor to permit it to be moved away from the doorway, the present mechanism being an improvement in part over that shown and described in my contemporaneously-pending application, Serial No. 29,879, filed September 13, 1900.

A further object of the invention is to provide an improved organization of mechanism for supporting and controlling the movement of the door, comprising rock-shaft mechanism for supporting the door on the car-body and a rock-shaft actuator for shifting said door.

Another object of the invention is to provide means for maintaining the door part way open, thereby to permit the ventilation of the car.

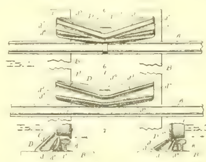
Another object of the invention is to provide, in connection with supporting means for the door, a rock-shaft actuator connected therewith by means having pivotal connection with such actuator, whereby the door may be swung outwardly from its bottom.

Car-Replacer

No. 686,241.

ROBERT E. ALEXANDER, of Forest City, Pa., assignor to Heitzman Tool and Supply Company, of New York, N. Y., a corporation of New Jersey.

My invention relates to improvements in car-replacers; and the object of the invention is to provide a cheap, simple,



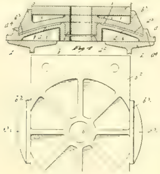
efficient, and durable car-replacer which will force the wheels of the derailed car to run over the replacers and ease down upon the rail without a jar and without the sudden shock so common in car-replacers when the wheels are run up to a position slightly above the track and then are allowed to drop on the track and also to support the car-wheels both on the tread and on the flange when being run up on the replacer. In practice it has been found that not only is the shock disagreeable to the passengers, but frequently the windows are broken, the car is otherwise damaged, and like objectionable results occasioned.

Center-Plate for Car-Trucks

No. 686,247.

JOHN C. BARBER, of Chicago, Illinois.

A center-bearing plate composed of an upper and lower member connected for swiveling movement in respect to each other, the upper member having a concave bearing-surface, and the lower member having a convex bearing-surface, at least one of said bearing-surfaces hav-



ing radial clearing-grooves, whereby water, dust, rust or other form of materials cannot accumulate between the bearing-surfaces of the two plates, but will be worked off and out through said clearing-grooves.

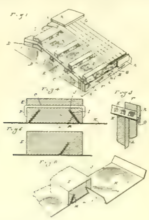
A center-plate composed of an upper and a lower member connected for swiveling movement in respect to each other, the upper member having a concave bearing-face and the lower member having a convex bearing-face provided with radial clearing-grooves, whereby water, dust, rust or other foreign materials cannot accumulate between the bearing-surfaces of the two plates but will be worked off and out through said clearing-grooves.

Car-Roof

No. 684,885.

WILLIAM D. THOMPSON and SAMUEL HERBERT, of Detroit, Michigan, assignors of one-fourth to Stephen J. Bowling, of same place.

In a car-roof, the combination with an internal and an external framework composed of wooden carlines and purlines and superpurlines respectively, the super-



carlines being provided with inclined slots formed in their lower faces and leading upwardly therefrom, of a covering for the external framework, an inner metallic roof intermediate the frameworks formed of a series of thin galvanized plates extending beneath the supercarlines and having upwardly and outwardly inclined flanges at their side edges engaging within the slots formed in the supercarlines.

In a car-roof, the combination of the supercarlines having inclined grooves or slots formed within and leading upwardly from their lower faces, and an inner roof formed of a series of metallic plates extending uninterruptedly beneath the supercarlines, each sheet having upwardly-inclined flanges at its side edges, and the adjacent flanges of adjoining sheets abutting and engaging within the slots formed in the supercarlines.

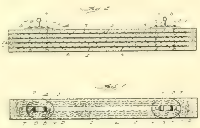
Railway-Tie

No. 685,048.

DUDLEY LAYING JOYNT, of Gonzales, Texas.

My invention relates to railway-ties, the object being to provide an inexpensive and durable substitute for the ordinary wooden tie in common use.

The invention consists of a railway-tie made of a composition of which sand and cement form the base and having embedded therein strips or strands of barbed wire, which serve to strengthen and brace the tie.



The invention further consists in a composition railway-tie having barbed binding-wires embedded therein in such manner as to reinforce and brace the tie both longitudinally and transversely.

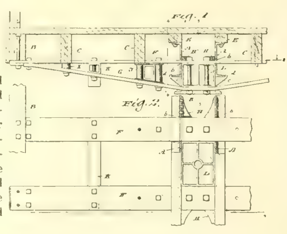
The construction of the improvement will be fully described hereinafter in connection with the accompanying drawings, which form a part of this specification, and its novel features will be defined in the appended claims.

Railway Rolling Stock

No. 683,755.

JOHN J. HENNESSEY, of Milwaukee, Wisconsin.

A railway car underframing having a pair of metal center sills provided with web-slots, the upper members of its body bolsters continuous through said slots, and stop shoulders on the center pieces of said bolsters in opposition to edges of said upper members of same.



A railway car underframing having a pair of metal center sills provided with web slots, the upper members of its body bolsters continuous through said slots, side flanges on center castings of the body bolsters under said sills and provided with lugs, and space blocks held intermediate of said upper bolster members and lugs of the center casting side flanges to lap sill flanges.

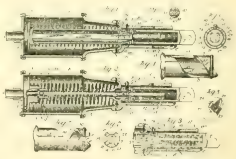
A railway car underframing having a pair of metal center sills provided with web slots, the upper members of its body bolsters continuous through said slots, side flanges on center castings of the body bolsters under said sills and provided with lugs, space blocks on the lugs lapping sill flanges, and bolts extending through said upper bolster members, space blocks, center casting flange-lugs, lower members of said bolsters and ears of bolster center plates between which and said castings said lower members of the aforesaid bolsters are fitted.

Automatic Slack-Adjusting Means for Brakes

No. 685,380.

SINCLAIR J. JOHNSON, of Nutley, New Jersey.

This invention relates to brakes, more particularly to an improved slack-adjuster therefor, the object of the invention being to provide improved automatic means for taking up the slack thereof, thereby to enable the brake-shoes to effectively act upon the wheels of the vehicle each time the brakes are set.



A further object of the invention is to provide an improved automatic slack-adjuster for brakes so constructed that it can be applied without material change to the brake mechanism ordinarily used on railway-cars, the organization being such that the number of parts forming the same are comparatively few and the assemblage and operation thereof simple.

In a slack-adjuster, the combination, with a cross-head having an interiorly-threaded tubular part, of a piston member having a threaded part projecting into said tubular part; and means for rotating said piston member relatively to such cross-head thereby to take up slack of the mechanism.

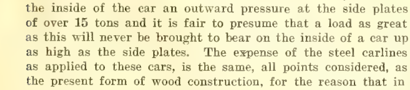
In a slack-adjuster, the combination, with a cross-head having an interiorly-threaded tubular part, of a piston member comprising a piston-rod rotable independently of the piston-head and having a threaded part projecting into said tubular part; and means for rotating said piston member relatively to such cross-head thereby to take up slack of the mechanism.

Pressed Steel Carline

The rapid progress made in modern freight car construction has received an additional impetus in the recent invention of the Pressed Steel Carline. The mechanical departments of our railroads have been greatly puzzled as to how they were to meet the demands made upon them for an increase of cubical feet of space in box and furniture cars, especially so when they had reached the limits of eave heights and widths. In fact, to a great many the only course left open was to reduce the depth of the wood carline, which has been done until now the wood carline is not of sufficient strength to support the roof properly or give the necessary stiffness to the upper framing of the car body.

The accompanying photographs illustrate the Pressed Steel Carline as made and applied to 500 38 ft. box cars, recently built for the Pere Marquette Railroad Co., at the Chicago plant of the American Car & Foundry Co., the carline being made of 3-16 in. steel pressed into a U-shaped section, having the metal of its side members turned outwardly at top and at center and points between its center and ends the flanges have recesses for supporting the ridge pole and purlines, and to which they are secured by two 1-2 in. carriage bolts and to side plates by two 1-2 in. bolts. Seven carlines per car, spaced 4 ft. 9 in. apart center to center and weighing 50 lbs. each, a saving in dead weight of 200 lbs. per car over the wood carlines, with an increase of 2 in. to 3 in. clear height at side plates and 5 to 6 inches at center of car over the wood carline; a decided advantage where trimming of car is necessary, as in loading grains, etc.

A test was made of one of the cars equipped with the steel carlines to ascertain if any permanent set would be given the carlines if a reasonably heavy load were placed on the roof. 7 1-2 tons of pig iron were evenly distributed on the running-board of a car from end to end, the deflection being 3-8 in. in carlines. This load was allowed to remain a few hours and was then removed, when it was found that the carline had not taken any permanent set. A load of 7 1-2 tons is more than any



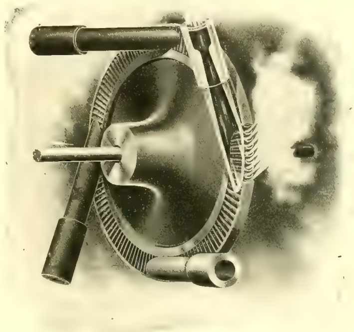
car roof will have to sustain. This load would represent on the inside of the car an outward pressure at the side plates of over 15 tons and it is fair to presume that a load as great as this will never be brought to bear on the inside of a car up as high as the side plates. The expense of the steel carlines as applied to these cars, is the same, all points considered, as the present form of wood construction, for the reason that in a 36 ft. or 38 ft. car but seven steel carlines are required instead of 11 or 13 wood carlines with the necessary cross-tie rods. On the 38 ft. car referred to, a gain of 54 cu. ft. of space was gained by the use of the pressed steel carlines. If the standard box-car dimensions are adopted as recommended by the American Railway Association at their recent meeting; being 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements, would give eave height of 12 ft. 6 in. with wood carlines, whereas with the steel carline (the inside height being maintained) the eave height would be 12 ft. 4 in. This is a decided advantage to the railroad companies, as the car siding can be cut from 18 ft. lengths, where if the wood carline is used, siding will have to be cut from 20 ft. lengths.

The American Car & Foundry Co. have secured exclusive control of the patents on the steel carline and will cheerfully furnish any further information desired.

De Laval Steam Turbine Co.

The general principle of the De Laval Steam Turbine will be understood from the illustrations. The construction of the turbine presents no extraordinary departure from every day enginering practice. However, the workmanship and material used, owing to the high speed employed must naturally be of the very highest quality.

The turbine wheel is mounted upon a slender flexible shaft and in such position relative to the wheel case as to revolve entirely free, liberal space being allowed on each side. The wheel case and the wheel case cover are so shaped as to form "safety bearings" around the hub of the wheel for the purpose of catching and checking its speed in case of an accident to the shaft.



The steam after passing through the governor valve enters the steam chamber D, Fig. 2, where it is distributed to the various nozzles. These, according to the size of machine, range in number from 1 to 12. They are generally fitted with shutting off valves E by which one or more nozzles can be cut out when the Turbine is not loaded to its full capacity. This allows steam of boiler pressure to be almost always used, and adds to the economy on light loads.

After passing through the nozzles, the steam is completely expanded, and in blowing through the buckets of its kinetic en-

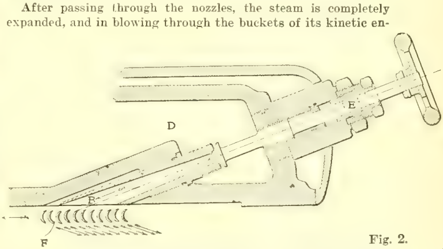


Fig. 2.

ergy is transferred to the turbine wheel. After performing its work the steam passes into a chamber and out through the exhaust opening.

The velocity of the turbine wheel and shaft, in most cases, too great for practical utilization, is considerably reduced by means of the spiral gear usually made 10 to 1. The gear is mounted and enclosed in the gear case. The pinion is made solid with the flexible shaft and engaging a suitable gear wheel. This later is forced upon the shaft, which with couplings connects to the dynamo or is extended for pulley. The governor is held with a taper-shank in the end of shaft and by means of the bell-crank, operates the governor valve.

BOOKS REVIEWED.

PASSENGER TRUCK, No. 27.

The catalogue lately issued by the J. G. Brill Co., of Philadelphia, is concerned with Passenger Truck No. 27. The many important points in truck construction which have been embodied in the design are here set forth. They are briefly, (1) a strong, stiff, substantial frame. (2) That the frame should not, under any circumstances, kick up under the action of the brake. (3) Springs placed immediately over the axle boxes. (4) The equalizing made perfect by allowing the weight to bear at the center of the equalizing bar. (5) When in motion there should be no jumping of the wheels over frogs, switches or irregularities in the track. (6) The distribution of the weight should be such that the boxes will not be canted in the jaws.

The longitudinal stability of the truck is such that the unpleasant tilting of the frame, due to the action of the brakes is eliminated. The behavior of truck No. 27 as compared with that of a truck of the M. C. B. standard type was tried on the Brooklyn elevated road. The M. C. B. truck frame tilted about 5 inches at the ends, while the Brill truck under the influence of brakes applied fully to make a sudden stop, maintained its equilibrium perfectly. The No. 27 Brill and the M. C. B. trucks experimented with, had each a 7-ft. wheel base. In the former the ration in favor of stability was about 2 to 1. while with the latter it was over 1 to 2 in favor of a tilt. This feature alone in the Brill truck would commend it strongly to the traveling public, though perhaps the public would not be able to clearly explain the reason for its satisfaction. Travellers in cars carried on these trucks would at least notice with satisfaction the entire absence of that most irritating "lurch back," which is generally experienced at the moment when a powerfully braked car actually comes to rest. It is a most desirable feature and may truthfully be described as a Brill-iant idea.

BALDWIN RECORD OF RECENT CONSTRUCTION

The record of recent construction No. 27 issued by the Baldwin Locomotive Works is a reprint of a paper read by Mr. S. M. Vauclain, superintendent of the works, before the Pennsylvania Railroad Y. M. C. A. last March. The paper deals with the question of broad or Wooten fireboxes. Mr. Vauclain, as is his custom, gives the subject thorough treatment, and traces the evolution of this form of firebox from its inception in 1877 to the present time. Mr. John E. Wooten, at one time superintendent of motive power of the Philadelphia and Reading R'd, brought out the firebox which bears his name, though the great success which it has attained is chiefly due to Mr. L. B. Paxton, formerly superintendent of motive power of the P. & R.

This catalogue, No. 28, printed in English and French, gives half-tones and dimensions of two Atlantic type engines, (one of them is for the Paris, Lyons & Mediterranean Ry.) four consolidation, two ten-wheel engines, two Moguls, four four-wheel switchers, and one called a six-coupled double-ender for the Government Railways of New Zealand. This is one of the type which the DIGEST called "St. Paul." The engine is a 4-6-2.

Catalogue 29 is a reprint of an article on the Building of a Modern Locomotive, by Mr. Paul T. Werner, which appeared in the *Brotherhood of Locomotive Firemen's Magazine*, Feb., 1901. The article is illustrated throughout by a series of beautifully executed half-tones.

CATECHISM OF M. C. B. RULES

The McConway & Torley Co., of Pittsburg, the well-known manufacturers of the Janney coupler, say in the preface to the catechism which contains 100 questions, "the demand for this little booklet, has grown to such an extent that it would appear that it has been accepted by the car men throughout the United States as a sort of text-book on the M. C. B. Rules."

The book is explanatory in character, and is illustrated by cuts from the code of rules. We desire to call attention to one very important question and its answer, which appears in this catechism. Question 41 asks, "How can we tell whether a car is too heavy for its axle or not?" The answer is, "All cars interchanged are required to have their capacity stencilled on them, and the table of axle dimensions for each capacity car is given in section 17 of Rule 3."

Although no remarks regarding the equity of this regulation are made in the little book, it is clear that if any car offered in interchange has not its capacity stencilled upon it, the owner is guilty of an infraction of the rules, which should put him out of court if he comes before the Arbitration Committee with a case, and further, he puts it out of the power of a conscientious car inspector to do his duty in the vitally important matter of inspection for safety which is the consideration above all others that should guide a railway company in handling cars.

"MITCHELL'S MODELS"

We have received from the railroad department of the International Correspondence Schools, which is situated in Chicago, a set of "Mitchell's Models." The particular ones which came to us were of the Engineers' Brake valve and the train-pipe governor. The "models" are beautifully engraved and colored charts, which give the valves in question, full size, and show them in elevation, plan, vertical section and numerous transverse sections, which show the ports, cavities and plain surfaces more clearly than if the actual brass valves had been cut up for inspection by the learner. In such a case the learner would be more or less in the position of the savage, who was supposed to find Paley's watch in the desert. He would know that the evidence of design proves the existence of a designer somewhere, but he might receive little else of value. We say that these charts display the internal mechanism more clearly to a student than would result from actual dissection of the valves, because the charts have the various parts appropriately colored, and have the name of each part given, together with a description of its function and how it does its work.

The chart of the Engineers' valve is particularly worthy of mention. A paper model of the rotary valve accompanies it. This adjunct to the chart is made thick enough to contain cavities, and, of course, it reproduces the ports. It has a copper rivet embedded in the centre, which is made to engage with an eyelet in the center of the valve face, so that in studying the Engineers' valve, the action of the whole apparatus and the function of each part is readily apparent.

The various temporary derangements which may affect the valve, are also graphically represented, as well as being explained in the letter press, with remarks as to the proper tests to be made in discovering such defects, and the remedies to be applied.

The idea of the whole thing is excellent, and it is well worked out. He must indeed be a dull student whose mind would fail to grasp the details of operation and maintenance of the Engineers' brake valve as here shown and explained.

AMERICAN SHEET STEEL CO.'S CATALOGUE

The American Sheet Steel Company of New York has just issued a catalogue, in which a number of half-tone illustrations show the company's works at Vandergrift, Pa.; Bridgeport, O.; McKeesport, Pa.; Scottsdale, Pa.; Niles, O.; Piqua, O.; Cambridge, O.; Leechburg, Pa.; Wellsville, O.; Chester, W. Va.; Struthers, O.; New Philadelphia, Pa.; Canal Dover, O.; Muncie, Ind.; Hyde Park, Pa.; Dresden, O.; Coshocton, O., and Dennison O. The catalogue also contains sizes, weights and prices of the various products of the company's works.

FRANKLIN MACHINE WORKS CATALOGUE

The catalogue of the Franklin Machine Works, of Philadelphia, Pa., has been received. It is a catalogue of Horizontal Boring Machines, Milling Machines, Cold Saw Cutting-off Machines, and shows a large variety of these tools. Each page contains a finely-executed halftone illustrating a machine with description, and information given immediately below.

THE DUSTLESS METHOD

A small pamphlet has recently been issued by the General Compressed Air House Cleaning Company, of St. Louis. The dustless method is explained by a series of engravings, rather than by any elaborate description in the letterpress. The carpet cleaner appears not only capable of taking all

dust out of the carpet, but it at the same time removes the dust which lies below the carpet. Stains can also be removed and a room with its entire furnishings càn be disinfected without disturbing furniture or hangings. Offices can be cleaned without any interruption of business. That feature of the system might possibly commend itself to railway managers and motive power superintendents, who are accustomed to carry out all sorts of repair and new work with little or no disturbance to the traffic, and if the "dustless method" is able to clean—that is, entirely removes dust without simply transferring it from one part of a room to another—and at the same time disinfect carpets, curtains, portieres and all sort of fabrics, seats, stools, bedding, etc., it might be found advantageous in the field of sleeping car cleaning and disinfecting, which is one of railway departmental operations upon which the public seems to have its eye at this time.

"HIS MAJESTY'S MAIL"

The New York Central's "Four Track Series," No. 11, contains a graphic account of the race with the Australian-London mail written by Mr. Charles Barnard. This was the first shipment of mail matter from the Commonwealth to Great Britain over the new route, and though it was 1,057 miles longer than the British, it was chosen because the Australian authorities wished to communicate by mail with the home government in the least possible time. There were 367 sacks of the most important mail ever made up in Australia for England. The total mileage of the American route is 13,557 miles.

The writer tells us, "His Majesty's Mail which left Sydney, Australia, on the morning of August 13 at 10 o'clock, was delivered at the Postoffice in London, assorted and ready for the carriers at 7 o'clock Saturday morning, September 14, 1901." The run across the continent is fully described, the mail being carried by the Southern Pacific, the Union Pacific, the C. B. & Q., the L. S. & M. S., and the New York Central. No. 6, the Lake Shore-New York Central, "Fast Mail," had left Chicago 38 minutes ahead of the Australian-London special, but was overhauled at Toledo, the latter having covered the last 244 miles in 265½ minutes. It was altogether a splendid piece of work.

Among the enthusiastic press comments given in this interesting folder, one from the Chicago *Chronicle* of Sept. 7, 1901, will deeply touch the hearts of motive power men everywhere. It said, "With a crash the wagons backed up to the heavy mail car under the great shed of the Lake Shore station. Engine No. 566 was quivering from the great pressure of steam that lay dormant beneath its scaly sides."

The crash of the mail wagons is all right, but at a time when America was striving to move His Majesty's mail with record-breaking celerity, was that the moment to refer to the engine's scaly sides? We are compelled to admit that boilers are generally more or less scaly inside, but why write about it publicly when we were enagged in "beating creation," perchance for English eyes to read of and scoff? In the æsthetic words of the Gilbertian opera of *Patience*, we sadly say to our Chicago contemporary, "Oh, Chronos, Chronos, this is too bad of you!"

A copy of the folder may be had on application to George H. Daniels, General Passenger Agent, Grand Central Station, New York.

American Exhibition in London

The Jubilee of the First Great International Exhibition, 1851, held in the Crystal Palace, has been celebrated this year by the Naval and Military Exhibition opened on May 23d by Field-Marshal Earl Roberts, K. G., which has been attended by the largest number of visitors during recent years. The year 1902 will be marked by a historical event—the Coronation of King Edward VII., in the month of June—which will draw to London the greatest number of visitors ever before known from the Provinces and abroad. In the popular celebrations which will take place throughout the Empire, the Crystal Palace will take the lead. No more auspicious time and place, therefore, could have been selected for a great exhibition, and from the support already forthcoming, a complete success is assured.

Mr. Alfred H. Post, Produce Exchange, New York, will be happy to give any information required by persons interested in the exhibition.

PESONALITIES

Albert E. Mitchell, heretofore Mechanical Superintendent of the Erie, has beeen appointed Assistant Superintendent of Motive Power of the Milwaukee and St. Paul Ry.

Roger Atkinson has resigned the position of assistant superintendent of the Canadian Locomotive Works, Kingston, Ontario. He was formerly superintendent of rolling stock on the Canadian Pacific Ry.

Charles Eddington has been appointed general foreman of the Atchison, Topeka & Santa Fe shops at Trinidad, Colo.

E. H. Harriman, Chairman of the Executive Committee of the Southern Pacific, has been elected President of that company, to succeed Mr. C. M. Hays, resigned.

W. L. Harrison, formerly Superintendent of Shops of the St. Louis & Southwestern, at Pine Bluff, Ark., has been appointed Superintendent of the Locomotive and Car Shops of the Central Railroad of New Jersey, at Elizabethport, N. J., vice Mr. R. O. Cumback, resigned.

J. Dalman, Jr., has been appointed master mechanic of the Pennsylvania at New Castle, Pa.

J. H. Davidson has been appointed trainmaster of the Missouri, Kansas & Texas at Smithville, Texas.

J. H. White, trainmaster of the Louisiana & Arkansas, has been appointed superintendent at Stamps, Ark.

S. R. Kramer has been appointed superintendent of the Chicago & Southeastern, with headquarters at Muncie, Ind.

S. W. Derrick has been appointed division superintendent of the Minneapolis, St. Paul & Sault Ste. Marie at Oakes, N. D.

W. J. Hemphill has been appointed master mechanic of the Santa Fe, Prescott & Phoenix, with headquarters at Prescott, Ariz.

C. M. Harrington, engineer on the St. Louis Southwestern, has been appointed traveling engineer of all the lines in Texas.

P. A. Horan has been appointed trainmaster of the Texas Midland, at Terrell, Tex., vice Mr. A. L. Burroughs, resigned.

F. Mertsheimer, superintendent of motive power and machinery of the Kansas City Southern at Kansas City, Mo., has resigned.

David Anderson, master mechanic of the Northern Ohio, has been appointed shop foreman on the Lake Erie & Western at Muncie, Ind.

Frank Singer has been appointed master mechanic of the Florence & Cripple Creek at Canyon City, Colo., succeeding Mr. Robt. Patterson.

W. J. Spearman has been appointed general foreman of the Pere Marquette at Port Huron, Mich., succeeding Mr. Horace Mann, transferred.

U. B. Williams has been appointed superintendent of the Wheeling division of the Baltimore & Ohio, with headquarters at Wheeling, W. Va.

D. W. Cunningham has been appointed master mechanic of the Rock Island & Peoria at Peoria, Ill., succeeding Mr. A. McCormick, resigned.

W. S. Fraser has been appointed trainmaster of the Louisiana & Arkansas, succeeding Mr. J. H. White, promoted; headquarters at Stamps, Ark.

A recent dispatch from London says: Sir Charles Rivers Wilson, president of the Grand Trunk Railway, announced that Mr. Charles M. Hays has been reappointed general manager of that road. Mr. Hays, it will be remembered, was general manager of the Grand Trunk system when in the fall of last year he was elected president of the Southern Pacific Company, as successor to the late C. P. Huntington. A few months later the Union Pacific acquired control of the Southern Pacific, and on October 1, E. H. Harriman succeeded Mr. Hays as executive head of the latter corporation.

The Allison Manufacturing Company, of Philadelphia, has appointed Messrs. A. M. Castle & Co., 54-60 South Canal street, Chicago, as Western representatives of the Allison Co.

Record of New Equipment

Ordered during the Month of November, 1901

CARS

Ordered by	No.	Class.	Built by
A., T. & S. F........	600	Frt.	Amer. C. & F. Co.
Atlantic Coast Line...	4	Pass.	Pullman Co.
At. Val. & Western...	1300	Frt.	Haskell & Barker.
Bessemer & L. E.....	1000	Hopper.	Pressed Steel Car Co.
Boston & Maine.....	200	Frt.	Laconia Car Co.
C. B. & Q.	800	Box.	Pullman Co.
C. B. & Q.	500	Flat.	Haskell & Barker.
Chic., R. I. & Pacific.	300	Refr.	Amer. C. & F. Co.
Chic., R. I. & Pacific.	800	Box.	Pullman Co.
Chic., R. I. & Pacific.	1000	Frt.	Amer. C. & F. Co.
Colo., & Crip. Creek..	6	Pass.	Barney & Smith.
D. & H.............	10	Pass.	Amer. C. & F. Co.
Den. & Rio Grande...	1500	Cars.	Amer. C. & F. Co.
Den. & Rio Grande...	500	Coal.	Amer. C. & F. Co.
Florida & E. Coast...	2	Mail.	Amer. C. & F. Co.
Ga., Fla. & Ala......	20	Frt.	Amer. C. & F. Co.
Ga., Fla. & Ala......	20	Flat.	Amer. C. & F. Co.
Ga., Fla. & Southern.	4	Pass.	Barney & Smith.
Hawkinsville, F. & S..	25	Flat.	Mt. Vernon Mfg. Co.
Illinois Central	6	Comb.	Amer. C. & F. Co.
Illinois Central	1000	Coal.	Amer. C. & F. Co.
La. & Northwest.....	30	Frt.	Amer. C. & F. Co.
L. E., All. & Wheel...	6	Pass.	Amer. C. & F. Co.
L. E., All. & Wheel...	3	Caboose.	Amer. C. & F. Co.
L. E., All. & Wheel...	50	Flat.	Amer. C. & F. Co.
L. E., All. & Wheel...	100	Gond'la.	Erie Car Co.
Long Island	10	Pass.	Pullman Co.
Long Island	7	Comb.	Pullman Co.
Long Island	2	Bag. & M.	Pullman Co.
Long Island	10	Bag & E.	Pullman Co.
Long Island	32	Pass.	Amer. C. & F. Co.
Michigan Cent.......	3	Dining.	Pullman Co.
M., St. P., & S. Ste. M.	6	Pass.	Barney & Smith.
M., St. P., & S. Ste. M.	2	Mail.	Barney & Smith.
N. Orleans & N'west..	30	Frt.	Amer. C. & F. Co.
N. Y., N. H. & H....	1000	Box.	Pressed Steel Car Co.
N. Y., N. H. & H....	100	Flat.	Pressed Steel Car Co.
No. Pacific..........	3000	Box.	Pressed Steel Car Co.
No. Pacific..........	20	Pass.	Pullman Co.
No. Pacific..........	4	Dining.	Pullman Co.
No. Pacific..........	25	Frt.	So. Baltimore Car Wks.
No. Pacific..........	300	Ballast.	Rodger Ballast Car Co.
No. Pacific..........	1000	Coal.	Amer. C. & F. Co.
Orange & N'western..	15	Frt.	Ga. Car & Mfg. Co.
Pere Marquette	29	Cabooses.	Amer. C. & F. Co.
Pere Marquette	500	Box.	Amer. C. & F. Co.
Penna.	32	Pass.	Amer. C. & F. Co.
Penna.	400	Refr.	Amer. C. & F. Co.
Phila. & Reading.....	1000	Box.	Amer. C. & F. Co.
Pitts. & L. E........	1000	Gond'la.	Pressed Steel Car Co.
Plant System	3	Parlor.	Harlan & Hollingsw'th.
St. L., K. C. & Colo..	150	Coal.	Amer. C. & F. Co.
St. L., K. C. & Colo..	25	Flat.	Mt. Vernon Car M. Co.
St. L., & San Fran....	491	Coal.	Amer. C. & F. Co.
S. P., L. A. & S. L...	50	Frt.	Pullman Co.
Seaboard Air Line...	300	Flat.	Amer. C. & F. Co.
So. Miss. & Ark......	50	Box.	Amer. C. & F. Co.
Texas & Pacific.....	2500	Box.	Amer. C. & F. Co.
Vandalia	5	Cabooses.	Amer. C. & F. Co.
Vera Cruz & Pac.....	30	Flat.	Amer. C. & F. Co.
Wabash	1500	Coal.	Amer. C. & F. Co.
Wheeling & L. E.....	1500	Coal.	Amer. C. & F. Co.

LOCOMOTIVES

Ordered by	No.	Class.	Built by
A., T. & S. F........	120	Locos.	Baldwin Loco. Works.
C. & B.............	25	Locos.	Baldwin Loco. Works.
C. C. C. & St. L.....	25	Locos.	Amer. Loco. Co.
Chic. & Eastern Ill...	5	Locos.	Amer. Loco. Co.
Chi., St. P., M. & O..	8	Locos.	Schenectady Loco. Wks
Chi., St. P., M. & O..	2	Switch.	Baldwin Loco. Works.
Chic. & Gr. Western..	20	Locos.	Amer. Loco. Co.
Chic., R. I. & Pac....	30	Locos.	Amer. Loco. Co.
Cin., N. O. & T. P...	10	Locos.	Amer. Loco. Co.
Coahuila & Pac......	4	Cons'l'n.	Baldwin Loco. Works.
C. S. & C. C........	2	Locos.	Amer. Loco. Co.
D. L. & W..........	10	4-w switch.	Amer. Loco. Co.
Den. & Rio Grande...	40	Locos.	Baldwin Loco. Works.
Detroit & Mackinac..	2	10-w.	Baldwin Loco. Works.
Erie	15	Cons'l'n.	Rogers Loco. Works.
Fla., East Coast Ry..	5	10-w.	Baldwin Loco. Works.
Ind., Ill. & Iowa.....	4	6-w.	Baldwin Loco. Works.
L. E., All. & Wheeling	6	Locos.	Baldwin Loco. Works.
L. S. & Mich. So....	25	Switch .	Amer. Loco. Co.
Lex. & Eastern......	2	Locos.	Baldwin Loco. Works.
Maine Central........	4	Mogul.	Amer. Loco. Co.
Mexican Central	15	8-w.	Baldwin Loco. Works.
Minn. & International	2	6-w.	Richmond Loco. Works.
N. Y., N. H. & H....	10	Pass.	Amer. Loco. Co.
N. Y., N. H. & H....	10	Mogul.	Amer. Loco. Co.
N. Y., N. H. & H....	10	Switch.	Amer. Loco. Co.
N. Y. C., & H. R....	20	8-w.	Amer. Loco. Co.
N. Y. C., & H. R....	15	6-w.	Amer. Loco. Co.
No. Pacific	52	Locos.	Baldwin Loco. Works.
P., C., C. & St L....	3	Locos.	Amer. Loco. Co.
Pitts. & L. E........	6	Cons'l'n.	Amer. Loco. Co.

OBITUARY

Arthur W. Soper, president of the Pintsch Compressing Co., the Safety Car Heating and Lighting Co., and a prominent figure in many corporations, clubs, and other organizations, died after a month's illness at his home, 150 Central Park South.

At the time of his death Mr. Soper was a director of the Standard Coupler Co., of which he had been one of the organizers, and the Citizens' Insurance Co. He had been a director of the Wheeling & Lake Erie Railroad Co.

Mr. Soper was born in Rome, N. Y., July 16, 1838. He was educated in the Rome Academy. When seventeen years of age he entered his father's lumber business, but in 1858 left his father to enter the freight offices of the Rome, Watertown & Ogdensburg Railroad. His advancement was rapid, and in 1871 he left the assistant superintendency of the Rome, Watertown & Ogdensburg Railroad to accept a similar position with the St. Louis, Iron Mountain & Southern Railroad. Within a year after accepting this position, he became superintendent, and later, general superintendent, and then general manager.

In conjunction with George M. Pullman, Sidney Dillon and others, Mr. Soper organized the Pintsch Compressing Co. and the Safety Car Heating and Lighting Co., whose products are in almost universal usage.

Trade Supply Notes

Pending the completion of many tests of their specialties in various parts of the country, the business of T. H. Symington & Co., of Baltimore, Md., will be conducted as heretofore from their Baltimore office under the direct supervision of Mr. Harvey Middleton managing director. Mr. W. R. Bean has been appointed general inspector of the company, and will look after these tests.

The Galena Oil Company and the Signal Oil Company have been consolidated into the Galena-Signal Oil Company, which will carry out all the contracts, perform all the duties and continue the business of each of the old companies.

It is announced that after November 15, 1901, the Lehigh Valley Railroad Company would refuse to accept for movement over its lines, cars constructed with iron pipe as sills, and castings for end sills.

The Pressed Steel Car Company, of Pittsburg, were the first to build large-capacity steel cars in America. The development of the industry cannot be better illustrated than by the fact that the Pressed Steel Car Company built in 1897 501 cars; 1898, 2,931 cars; 1899, 9,624 cars; 1900, 16,671 cars; up to and including November, 1901, 23,381 cars, making a grand total of 53,108 cars.

The Bessemer & Lake Erie Railroad is one of the many American railroads which has adopted the pressed steel car. It hauls iron ore from Lake Erie to Pittsburg and coal to the Lakes. From the moment it was put into operation pressed steel cars of 100,000 lbs. capacity it showed 73 1-2 per cent. paying load to train weight and showed train mile earnings of $5.38 per mile.

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GEORGE S. HODGINS, Editor

Standardization No Check to Progress

The standard box car, when it comes, will bring with it economies of various kinds. Standard sizes of timber and lumber, if determined upon, will be obtained by users, more readily and more cheaply than odd sizes are now. Less stock will have to be carried by railways, by reason of greater uniformity in material. There will in time come to be commercial sizes of lumber, known to the trade as "M. C. B. sizes," or "Railway specification," or by some such distinctive name. These railway commercial sizes will be as advantageous in their way, to all concerned, as the commercial shapes of rolled steel are now.

The standard box car will save money, but many people have feared that this tendency to standardization, especially when it begins to take concrete form, would have the effect of checking development or progress in new ideas. This fear, it appears to us, is groundless. The fact that the M. C. B. Association has prescribed the contour lines of the vertical plane coupler, has not restricted the free play of original inventive genius which has been brought to bear upon the problem. In the matter of standardization of railway material or appliances, on broad and liberal lines, requiring the observance of definite principles rather than the adoption of definite articles, the M. C. B. Association has, as it were, placed a target plainly in view of the firing party; and consequently fewer shots will go wild. It does not specify the kind of fire-arms to be used. It is true that a limited number only will make "bull's-eyes," but there will be "inners," "magpies," and even "outers," to reward, in varying degree, the attempts of the less successful, but the concentration of aim will certainly benefit the railway world in general.

This process, with its useful economy of effort, will, however, discourage simple diversity of design without hampering progress in new and useful ideas. Different spacings of similar members is a form of diversity, in design, from which no practical good is obtained. One designer fastens two members together with a key, another does the same thing, using bolts. Neither can claim any distinctive advantage over the other, to offset the decided disadvantage, of useless diversity of design, when foreign repairs have to be made.

The Standard Christie brake shoe, fastened to the brakehead with its almost unloosable curved key, is an example of standardization which has not in the least restricted the efforts of those who make soft iron shoes, hard iron shoes, chilled shoes, steel shoes and all the differing kinds, from the "stop-the-car" variety, to the "never-wear-out" shoe. What such standardization has prevented is the perpetuation of needlessly diverse methods of doing the same thing. Each method often held to, by its designer, as if he alone had found the philosophers' stone, and often insisted upon by the railway adopting a particular design, notwithstanding delay and extra cost for repairs, with a pertinacity worthy of a better cause. All this; standardization stops. The bolt-and-nut-or-nothing design has to give way to that which the Association declares to be standard; the hook-and-clip-forever plan, is ruled out of the race; and the persistent complicated Pike's-Peak-or-bust-puzzle arrangement is relegated to the scrap pile. All of these designs may have had something to recommend them, in fact none of them may have been inherently bad; it is simply that the clothes do not fit the customer, they may be made of good cloth, and they may be well made, but they do not fit. Standardization measures the customer; the quality of the cloth used is then largely a matter of choice, after one knows whether he wants smock and overalls, or a dress suit.

Head Lights

The subject of headlights is exciting some interest just now, and two patents have recently been issued which have for their object the turning of the lamp so that it will give light on the track as the engine goes round a curve. Whether or not, these devices will be used remains to be seen, but they serve to emphasize the fact that the headlight is, or is intended to be, a source of illumination for the track at night.

Some have thought that the headlight is intended, not so much for the use of the men on the engine, as it is to serve as a warning to others, of the approach of the locomotive. Those holding this view have pointed to the fact that in England, where grade crossings are rare, the headlight is nothing more than a signal lamp and gives little or no light on the track. We believe that in this country the headlight should perform both functions, and that the lighting up of the track ahead of the runner, is the more important of its uses.

The reflector generally used, is believed to be parabolic in section. That is, the form of the reflector is determined, or as mathematicians would say, is generated, by revolving a parabola about its own axis. A parabola, as every one knows, is a curve made by cutting a cone with a plain parallel to its edges, if one may speak of a cone's edge. If the headlight has a parabolic reflector, the flame is placed as nearly as may be, in the focus of the curve. One of the properties of such a reflector is that rays of light passing out from it follow lines parallel to its axis. The object, in using this form, would seem to be to throw a concentrated beam of light ahead, parallel to the ground and of the full diameter of the mouth of the reflector.

As a matter of fact two distinct light radiations pass out from a locomotive headlight. One is the direct light which coming from the flame, radiates in a cone, which is defined by lines drawn from the flame, and just escaping the edge of the reflector. The other is the reflected light, which is poured forth in a nearly cylindrical beam, parallel to the axis of the reflector. The flame being, of course, only approximately in the focus of the reflector the beam of reflected light is in reality slightly conical, but it is not of sufficient conicity to reach the track at any distance which would be useful to the occupants of the cab.

The circles of direct and reflected light may be easily observed in any round house at night, if an engine is standing close to a wall, or before the closed doors of the running shed. The direct light will make a circle of comparatively feeble light, perhaps six or eight feet or more, in diameter, according to the distance of the light from the wall. The reflected light will be revealed by the brightly luminous circle, slightly larger than the headlight glass. This difference between direct and reflected light, is often apparent at night when snow is falling or when mist is in the air.

There is, however, another form of reflector which might be made, if it is not already in use, which would throw the reflected light in a much more divergent beam, than the one we have been considering. The curve of such a reflector would also be a conic section, but it would have a different property.

If locomotive headlights had hyperbolic reflectors, the divergence of reflected rays would be much more pronounced. It is difficult to concisely describe the property of a hyperbolic reflector, but roughly speaking it is to throw off light rays at the angle, and in the path they would follow if they eminated direct from a point a certain distance behind the existing source of light. This point is mathematically determined when the curve of the hyperbolic reflector is known. The point where the flame is situated, and the point from which the light would appear to radiate from, are called, in scientific language, the congugate foci of the curves.

The present, or parabolic reflector, is in a certain sense, a search-light, by which a concentrated beam of light is sought to be thrown upon some distant object. The hyperbolic reflector would permit the direct light to be thrown as is now done, but would add a bright and much more divergent reflected beam upon the line ahead.

It seems to us that an electric headlamp with a hyperbolic reflector, would cast a powerfully brilliant track illuminating and warning beam of light ahead of the "midnight Limited," by which the "man behind the throttle," would be able to run more by sight and less by faith than he does now, with the feebly oil illuminated headlight which most locomotives carry; but which is unquestionably useful to passengers on a station platform, five miles away, to indicate beautifully when "she's in sight," but which overlooks a low down obstruction on the track until the flyer gets to what's sometimes called "close quarters," after which may follow, Form A999; accident report.

The Standard M. C. B. Box Car

As the standard car question now stands it is necessary for the car builders to act, because one of the primary objects of the American Railway Association was to pave the way for car construction which shall enable the railroads to obtain the benefits from the better market conditions with regard to standard timbers and the reduction of the delays in repairs now caused by the absence of such standard sizes. Careful estimates place the effect of this as amounting to a virtual increase of 5 per cent. in the amount of car equipment available for use. If lumbermen are called upon to furnish only standard timber and other lumber, they will be able to cut it specially for car work, and this must affect both the time of deliveries and the price. The difference in the items of siding and flooring has been placed at $1 per thousand. It may be even greater when all the wooden members are standardized.

If the standard car should tend to check development or progress in new ideas it would not be an unmixed blessing, but sufficient scope for development seems to remain in such items as the trucks, bolsters, draft gear, brake beams and roof coverings. In larger matters the association will be able to keep the standard abreast of all improvements. This will be a comparatively simple matter with the sizes once established, and the problem is one of constructon only, whether the material is wood or steel, or both. Other types of cars may be given the same treatment in their trun. In this work, beginning with the box car, the Master Car Builders' Association will find a field worthy of its skill and traditions. This movement accomplished, the introduction of per diem charges for the use of cars may be undertaken.—*American Engineer.*

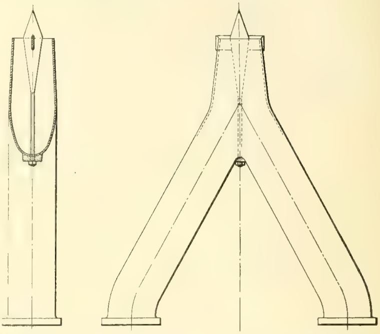
Excessive Zeal

The La Crosse division established a new flag station the other day. It was nothing but a whistling post, but the road built a platform and laid a sidetrack. There was not enough business to pay a regular agent out there, so the old fellow who keeps the store was appointed a kind of an agent. The first day there the through passenger train was coming at about forty miles an hour, and the old fellow was on the platform waving his red flag. The train stopped at the platform. When the conductor jumped off there wasn't a man in sight except the man who ran the store. "Where's your passengers?" the conductor asked him. "Why," he says, "I haven't got any passengers," "What did you flag us for?" "I thought mebbe some one wanted to get off here."—*Minneapolis Sentinel.*

English Exhaust Pipe

Crewe, England, 10th December, 1901.

Editor:—In last month's (Nov.) issue of the RAILROAD DIGEST I noticed an illustration and description of a "new exhaust pipe" for locomotives designed by Mr. J. B. Barnes, of the Wabash Railroad.



As showing how, sometimes, two individuals, quite independently of each other, work out the same idea, I enclose you a tracing of a cone or torpedo for a locomotive exhaust pipe which I designed in January, 1887, and applied to some of our locomotives at that time, from which it will be seen that I was then working at the same idea that Mr. Barnes has lately been trying to carry out in his "new exhaust pipe."

Yours truly,
F. W. WEBB,
Locomotive Superintendent,
London & North Western Railway.

The Andrew Ventilator

By invitation of the Andrew Ventilator Company, of Newark, N. J., a party of railroad officials and other persons interested in the subject of passenger car ventilation, on Wednesday, January 8, made a trip from Jersey City to Philadelphia and return to observe the working of the Andrew Ventilator with which a car of the Jersey Central Railroad is fitted. The ventilator, which is the invention of Mr. William E. Andrew, and which has been in use for over a year, is of the deck sash exhaust variety which depends for its operation upon the motion of the car, and is an improvement upon prior efforts of inventors in the same direction. Its construction is that of a flaring wind scoop, such as has been largely used by the Pullman Company and the Pennsylvania railroad, with additional mechanism inside it consisting of a horizontal tube with movable funnel shaped ends, adapted to be placed in close contact with the tube or removed therefrom according to the direction of the car, and operated by a lever in the grating which takes the place of the deck sash inside the car.

The test amply demonstrated the efficiency of this device as a deck exhaust ventilator, its effect being to keep the car at all times clear of the smoke generated by the guests from the cigars provided, for the purpose, by the proprietors of the ventilator. We shall probably be able to publish an illustrated description of this attachment in the near future.

A somewhat novel form of rail joint is said to have recently been introduced on the Michigan Central Railroad by the chief engineer, Mr. A. Torrey. It is a base support joint located between ties, and comprises in addition to angle bars on either side of the rails, fastened together by four bolts a short piece of rail inverted and placed under the joint. This piece of rail is fastened to the flanges of the angle bars by U-bolts. Three of these bolts are used in some cases and two in others, the presence of the middle bolt having not been proved absolutely necessary.

Electric Power Plant in an English Car Building Works

The works of the Metropolitan Railway Carriage & Wagon Co., Ltd., at Saltley, near Birmingham, England, occupy a site of about 47 acres, situated on the line of the Midland Railway and are also connected with a branch of the London and North Western Railway. The works at the present time are being reconstructed and new building are in course of erection, the old ones being either pulled down or modified. At the same time, the machinery is being modernized and the power distribution changed from a system of independent and isolated steam engine plants to a comprehensive system of electrical distribution.

The work done consists of the manufacture of railway carriages and wagons of all types and sizes, street cars, and all classes of vehicles for heavy and light railways. The various stages of manufacture are each carried on in distinct departments, arranged, as far as possible, in such order of position that the least possible time is spent in the transfer of materials and partly finished products between them. Up to within the past few months steam engines with their boilers, located at various centers in the works, transmitted power by belts and shafting to the machinery. All this is now changed. The power generating plant for the whole of the works is centralized in a separate building, from which power, in the form of electricity, is distributed to all parts of the works by overhead conductors. Not content with adopting electricity as a well-tried and proved economical agent for works power purposes, the management of this go-ahead concern resolved to abolish steam engines and boilers in favor of gas engines and gas producers. The practical results obtained were all that could be wished. The new power installation is perfectly reliable, and careful tests have proved that the economy of the system is higher than one could ever hope to obtain with steam plant under similar conditions. This admirable state of affairs has been brought about by the foresight and enterprise of the company and its engineers.

The Gas House is a new brick building, about 74 feet long by 20 feet wide, and contains three Dowson gas producers, together with the usual small steam boilers required for the plant. The washers, scrubbers and has holder are erected just outside. The gas engines and electric plant are in a new building alongside the gas house.

The present installation consists of three direct coupled Westinghouse gas engine generating sets of 150 KW. capacity each. Foundations are in for a fourth set, which will complete the plant.

The engines are vertical and have three single-acting cylinders. The three cranks are placed at 120 degrees with each other, and the crank shaft receives a propelling impulse every two-thirds of a revolution. Furthermore, an explosive mixture is admitted to each cylinder at each two-thirds of a revolution, the amount of the mixture admitted to each cylinder per cycle, being proportioned according to the load, so that even with light or varying loads the explosions occur at frequent intervals, thereby ensuring a perfectly even turning moment for all loads.

The speed regulation is as good as in the most sensitive steam engines. The fuel, gas and the air making the explosive mixture, are not admitted by separate valves to each cylinder—there is one admission valve per cylinder through which both gases, already mixed in the best proportions, are admitted. The quantity of this mixture admitted per stroke is proportional to the load on the engine. The gas and the air supplies, feed each through a valve into the mixing chamber. These valves are capable of easy and definite hand adjustment. Between the mixing chamber and the cylinder valves, is a valve controlled by a sensitive fly-ball governor, so that the number of impulses per revolution is always constant and maximum. The constituents of the explosive mixture, admitted to each cylinder every cycle, are in correct proportion so that the best effect and the greatest possible economy is insured for all loads. The well-balanced construction of the engine, combined with this principle of governing, has enabled this type to excell even the best of steam engines for all purposes. More useful energy can be drawn from a pound of coal by the use of this engine than can be had by the employment of any other type. The ignition of the explosive mixture is accomplished by an electric spark. The spark-contacts are in the clearance space at the cylinder heads. The pairs are in duplicate in each cylinder to insure reliability of operation. Current for ignition is supplied by a battery of six primary cells when starting the engine, but when running, a small magnetic dynamo driven by the engine maintains the supply. The engine is started by compressed air, drawn from a storage tank which is kept constantly charged. The electric motor drives also the hydraulic circulating pump by which water is drawn from a small reservoir, passed around the engine cylinders for cooling purposes, and afterwards discharged into the reservoir.

Each of the gas engines is direct-coupled to a Westinghouse alternate current generator. These are of the revolving armature type each of 150 KW. capacity, yielding two-phase current at a pressure of 220 volts per phase, running at a normal speed of 200 revolutions per minute. Fig. 1 gives a very good idea of the construction and appearance of the generator. The field consists of 36 pole-pieces, made up of soft steel stampings, projecting radially from the inside of a circular ring into which they are cast. Each pole-piece carries a coil of the field winding. The coils are machine-wound on bobbins which slide

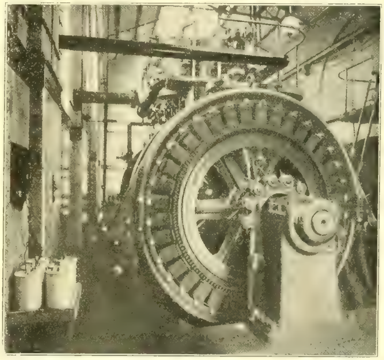


FIG. 1.-WESTINGHOUSE TWO-PHASE ALTERNATOR.

easily into position on the pole-pieces where they are secured to the field ring by set screws through projecting lugs. The armature is built up on a cast-iron spider. It is of the sloted core, iron-clad type. The conductors are of copper bar, insulated before being threaded into the core slots where they are securely held by the overhanging lips of the slots. Ample provision is made for the ventilation and cool running of the machine. The machine has consequently a large overload capacity. Overloads of 50 per cent. can be sustained for a very considerable time without causing undue or injurious heating to any part of the machine, and overloads of 75 per cent. can be safely carried for short runs.

Each alternator has its own exciter, which is driven by belt from the opposite end of the engine shaft. These are small machines of the well known Westinghouse multipolar direct-current type.

The main switchboard is installed at one end of the engine house. It consists of six white marble panels, supported on a wrought iron frame work. There is a panel for each generator, and three feeder panels. The generator panels carry the exciter circuit switches and regulators, the main alternate current switches, and the usual indicating instruments; in addition to this they are fitted with voltmeter and transformer plugs, and indicating lamps for synchronizing purposes. The generator sets are designed to run in parallel, and they do so

excellently—a decided proof of the even turning moment, and the close speed regulation, of the gas engine.

The iron foundry is a new building about 150 feet long by 50 feet wide, and contains the usual plant for making small sized castings. The pattern making shop is built at one end of the foundry, and along one side are arranged the brass foundry, cupolas, and casting dressing shop. Between the lower end and the pattern shop is a pump house in which a 30 hp. electric motor is installed, which is used for driving the machinery in the dressing shop, and some of the machines in the pattern shop.

Between the foundries and the smiths' shop is placed the new machine and fitting shop; it is about 500 feet long by 80 feet wide, and was built over other smaller shops in which work went on during the building operations. These shops have been taken down, the material passing through the doorway of the new machine shop. The southern end is devoted to the grinding department, where several grind-stones are driven by belt from overhead shafting, coupled by belt to a 30 hp. motor. They are arranged at intervals along the eastern hp. each. They are arranged at intervals along the eastern side of the building, each driving by belt a section of the overhead shafting. The first section is taken up principally with the small lathes, drilling machines, etc., and the second and third sections with larger machine tools. A fourth motor of 40 hp. is about to be installed at the north end.

The blacksmith department occupies a ground space of about 80,000 square feet, and is at present probably the most bustling and overcrowded of any branch in the works. The old buildings are being considerably altered, and the hearths are all being rebuilt. An electrically driven Sturtevant blower provides draught for some of the fires. Other power machines are still driven by steam engines, but electric motors of 150 hp. are to be substituted. The hydraulic shop at the northern end of this department contains modern heavy hydraulic forging machines. Two electric motors are installed in this shop, one of 40 hp., and one of 50 hp., the larger one supplying power to the large forging machines. The smaller motor drives an air-compressor from which rivetting machines, chipping, drilling, and other portable pneumatic tools are supplied.

The wood-working department consists essentially of three timber store sheds, and a large wood-working mill. Large timber yards are stocked with quantities of teak, oak, mahogany and other kinds of lumber. The handling of the timber logs is carried out by a steam-driven jib crane.

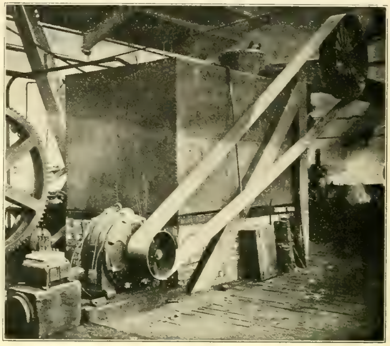
TYPE "C" MOTOR OPERATING MACHINE TOOLS.

The various wood-working tools are driven by belt and shafting placed under the floor. The steam engine and the boilers now used are shortly to be replaced by 160 hp. motors.

The assembling of the carriages and wagons is carried out in a large, new building. The roof is in five spans supported by wrought-iron columns. Each of the five bays thus formed is traversed throughout by three rail tracks, the tracks running out at each end to a traverser, which is wide enough to accommodate the largest railway carriages. The traverser carriages are now being fitted with electric motors of a sufficient power to drive them at a speed of four miles an hour.

The paint shop forms practically an extension to the east of the car shop building. Several small wood-finishing machines are installed in this shop. These are to be driven by about 30 h.p. electric motors.

The motors installed throughout the works are all identical in construction, differing only in size. They are Westing-



TYPE "C" MOTOR OPERATING AIR COMPRESSOR.

house type "C" alternate current induction motors. Having no rotating coils and no collecting rings or commutators, skilled attendance upon the motors is not required. The only rubbing surfaces are the bearings, which are fitted with automatic lubricators. The motors are self-starting under load. A two-way switch is provided with each motor. The switch is in a vertical position when the current is cut off. On throwing the switch down to one side the motor is started at reduced pressure. When speed is up the switch is thrown over to the opposite side, by which operation it is placed directly across the supply mains from the main station switchboard. The reduced starting pressure is drawn from the secondary of a small transformer placed in the box below the starting switch. This transformer or "autostarter" has additional loop wires brought out from its secondary, so that the secondary pressure may be varied to give the best starting effect for the work imposed on the motor. This may be adjusted once for all for a fixed motor, used constantly for certain work. Another advantage in this installation is that, as no part of the electrical circuit is exposed, it is independent of climatic conditions or surroundings, and it can be used with perfect safety in shops where inflammable materials are worked. Fire risk is thus reduced to a minimum. The Westinghouse type "C" motor, being practically a constant speed motor, is unsuitable for the operation of the traversers and type "F" motor are to be used. This latter is an induction motor, and works on similar principles to the type "C," but the secondary, or rotating part, is modified to give variable speeds.

Carriages and wagons manufactured at these works are, with very few exceptions, to be found among the rolling stock of all the British railway companies. The works are also constantly engaged on Government contracts for South Africa, Ceylon, India, Australia, and other colonies. Many large foreign railways are also supplied, such as those in Brazil, Argentine, Japan, China, and others too numerous to mention.

When the alterations and improvements, now in progress, have been completed, the Saltley Works will certainly be the largest and best equipped of any similar engineering concern, in the United Kingdom. Two other large manufacturing concerns in Birmingham have already profited by the example set in this plant, and have contracted with The British Westinghouse Electric & Manufacturing Company for similar installations.

The Digest: A Monthly Synopsis of Universal Railroad Literature

Maintenance of Way, Bridges and Buildings

Railroad Tunnels Under the Hudson River

Street Railway Journal, Dec. 21, 1901, p. 879.

Great interest was excited in railway circles by the announcement of the proposal of the Pennsylvania Railroad to run its trains to New York City through a tunnel under the Hudson River, and the alleged purchase by the North Jersey Street Railway Company of the half-completed tunnel between Washington Street, Jersey City, and Christopher Street, New York. The Pennsylvania Railroad Company made the following announcement:

The Pennsylvania Railroad Company is now prepared to carry out its policy, long since adopted, of extending its railroad into New York City, therein establishing a suitable passenger terminus for the accommodation of the public.

After years of exhaustive study the conclusion has been reached that a tunnel line, operated by electricity, is in every way the most practical, economical, and the best both for the interests of the railroad company and of the city. The line, as adopted, will traverse the city of New York from the Hudson River to the East River, and be under ground throughout and at such depth as not to interfere with the future construction of subways by the city on all its avenues, similar to the one now building along Fourth Avenue.

As the railroad will be wholly under ground and operated electrically, in the same manner as the recently constructed Orleans Railway extension in Paris, it will not be objectionable in any way. There will not be any smoke, dirt, or noise, and as all the surface property may be built upon after being utilized underneath for railroad purposes, the neighborhood of the station will be improved instead of marred, as it so often the case when railroad lines are constructed on the surface or elevated.

A plan and section of the proposed tunnel from Long Island City to the New York and New Jersey State line in the Middle of the Hudson River, are presented herewith. The route in New Jersey, where connection will be made with the present tracks of the Pennsylvania Railroad, has not yet been announced. Two tunels will be laid, however, certainly at first, and will run side by side under the river from a point near the Hoboken line to the State line. There they divide, one running to and under the bulkhead line at West Thirty-First Street and the other beneath the foot of West Thirty-Second Street.

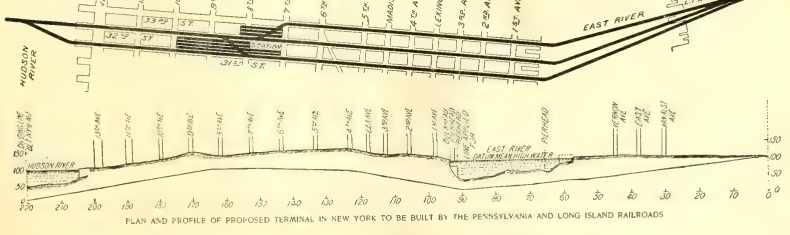
The Long Island route will require, as shown, three tunnels At the East River line they will turn northward at an angle of about 30 degrees, converging at the same time, until they reach the block between Borden Avenue and Flushing Avenue, just south of the Long Island Railroad station and ferry slips on the Long Island City side. The two southern tubes are brought together near Vernon Avenue, Long Island City. The northernmost joins them at East Avenue, and the three come to the surface on the Long Island's tracks, at Thompson Avenue and Purves Avenue, about a quarter of a mile back from the East River.

It is unlikely that any great proportion of the Pennsylvania's suburban trains will come into Manhattan, at least at first. For its express and through trains, two tunnels to Manhattan, it is said, will probably be enough. For the Long Island, on the other hand, two tunnels would not enable it to run all its express and suburban trains into Manhattan. The use of a third tunnel is made imperative by the large number of trains coming in and going out at the morning and evening rush hours, respectively.

Notes on Track

Railway and Engineering Review, Dec. 21, 1901, p. 813.

The roadmaster of the C. M. & St. P. Ry., Mr. E. Laas, instituted, some years ago, a section foreman's debating society. All the section foremen, 34 in number, are members. At a recent meeting a discussion as to the relative merits of bolted and rivited frogs, was decided in favor of bolted frogs, because if bolts get loose they can be tightened while rivets cannot. A committee advised placing fresh earth around fence posts and telegraph poles, to prevent them catching fire when it was necessary to burn over the right of way in summer



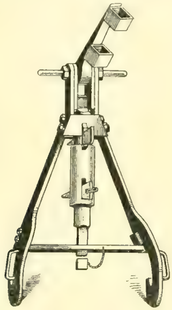
PLAN AND PROFILE OF PROPOSED TERMINAL IN NEW YORK TO BE BUILT BY THE PENNSYLVANIA AND LONG ISLAND RAILROADS

It was held that steel in track creeps more the first year than it does later. On the question of selecting ties for joints the practice of placing the largest tie at the shoulder, under the receiving rails on double track for suspension joints was favored. A lengthy talk on rail joints showed a unanimous preference for the continuous joint splices 26 inches long. A committee reported in favor of the method of filling in and dressing double-track road bed which provides a ditch midway between tracks 8 inches lower than the bottom of the ties with tile drain leading under the track at intervals of 500 feet. The method of drainage adopted by vote was, "Approaches of highways at crossings should be dug out 5 feet from the ends of the ties to a depth of 1 foot below the bottom of the ties at the ends of the same, and 18 inches below the bottom of ties 5 feet from the ends of the same, this space to be filled with cobble stones. The fact that the section foremen are on the ground all the time and are thus enabled to observe conditions and results in minute detail should make their opinions valuable.

Self-Feeding Rail Bender

Railroad Gazette, Dec. 27, 1901, p. 892.

Messrs. Fairbanks, Morse & Co. have recently put on the market an automatic bender and straightener which is shown in the engraving herewith. It will be noticed that it is self-feeding and thus saves time over those rail benders which require a new adjustment at every stroke. The cut shows its simplicity and the method of operation. After placing the forks over the rail the weight of the wedges will automatically set the ram up tightly, the loose block being interposed between it and the web of the rail. No further adjustment is



required. It is now only necessary to move the lever back and forth, when the triangular wedges will feed down alternately and automatically at each stroke. When the curve desired has been made the rail can be released instantly. It can be used as well for straightening bent rails.

A gauge or stop is attached to one of the wedges so that if the full limit of bend provided for is not desired it can be stopped at any point. If the gauge is left set in the same position other rails can be given exactly the same curvature. No oil should ever be put on the wedges. This tool is made in sizes to take rails up to 100 lbs.

Signals that Are Difficult to See

Railway and Locomotive Engineering, Dec., 1901, p. 515.

Mr. J. P. Kelly writes to *Locomotive Engineering* and deals with the color blindness tests which are applied on railroads. He says railroad employes do not now object to the color test when properly and honestly applied.

It is demanded of the enginemen that he shall possess the ability to distinguish color and position of signals at a certain distance but when the railroad company erects a system of fixed signals, in nine cases out of ten, a number of the signals will be found to be located in such position as to be obscured by buildings or curves so that they cannot be seen until one is very close to them. Signals can be found that are erected in locations where they have no background whatever, except the sky, and these, during certain times of the year when the sun is directly behind them cannot be easily seen until close to them.

He gives an account of an accident which occurred nearly a year ago to a passenger train hauled by two engines, double heading, in which inability to see signals contributed largely to the disaster.

In this particular accident, a flagman was sent out to flag the passenger train, but he was missed by the engineer, on account of the sun being directly behind him, and flooding him with light, and because of the difficulty in seeing the block signal the engineer was constantly on the lookout for it.

Had these signals been provided with a proper background, such as Mr. Garrett of the Wabash road found necessary to adopt for his fixed signals, it would have relieved the engineer of the necessity of looking out constantly for the semaphore arm, standing high in the air, and he might have been able to see the flagman, which he missed entirely, although in this case he could not stop in time to prevent collision, owing to the low efficiency of the braking force employed upon the train.

A signal engineer to-day, in addition to his knowledge of the operation of block signals, should possess considerable knowledge of electricity and the science of optics, which would enhance the value of his services. A signal engineer who is not an electrician cannot get satisfactory results from the operation of a system of signals that are more or less controlled by electricity, nor can he, without knowledge of the laws which govern vision, be able to locate all blocks and signals to the best advantage.

Automatic Signaling on the Lehigh Valley

During the last month the Lehigh Valley Railroad has finished equipping its main line between Jersey City and Buffalo with automatic electric signals, making it the only trunk line thus far having a complete automatic block system between these points. The system used is the Hall system of automatic track circuit, normal danger; both the disc and semaphore types being used.

The disc type, as is well known, consists of a case or, as it is more commonly called, a "banjo," mounted on a mast, having within its walls separate openings for the display of both day and night signals. The signal disc stands normally at danger, being brought to that position by gravity, and is drawn to the safety position by means of an electro-magnet.

The semaphore type consists of a hollow pipe mounted on an iron box about 6 feet high and 22 inches square. Within this box is placed the mechanism for operating the signals, which is driven by a one-sixth horse-power motor. To this mechanism are attached the up and down rods, which are placed on the inside of the mast, which are in turn attached to semaphore shafts at the top.

Each mast displays two signals, a home and a distant signal, to show to an approaching train if the blocks ahead are clear or occupied.

All switches in the main track are taken into the signal circuit, and are provided with switch instruments connected to the switch point in such a manner that the opening of any switch will hold the home signal of the block in which the switch is located at stop, and the corresponding distant signal at caution, until the switch is again closed.

The opening of a switch at either end of a main track cross-over holds the signals in both directions at stop in the same manner.

All switches are provided with visible indicators, and when located in any particular block display a red disc from the time a train enters the second block back until it has passed out of the block in which the indicators are located.

The main line between Jersey City and Buffalo is divided into 366 eastbound and 379 westbound blocks, or a total of 745 blocks in both directions. Of these blocks 516 are equipped with the disc type and 229 with the semaphore type. There has also been some signal apparatus installed on some of the branches of the road, amounting to 34 blocks.

The signalling of the whole system may be summarized as follows:

Main line, disc signals, 1,032; semaphore, 458; branches. disc, 62: total, 1,552.

Mileage, main line double track, disc signals, 264 miles; semaphore, 164 miles; main line, single track, disc signals, 11 miles; branches, single track, disc signals, 28 miles.

The average length of blocks is 1.16 miles and the total number is 745, divided as follows as to length: Blocks under ½ mile in length, 71; from ½ to ¾ mile, 104; from ¾ to 1 mile, 156; from 1 to 1¼ miles, 137; from 1¼ to 1½ miles, 117; from 1½ to 1¾ miles, 80; from 1¾ to 2 miles, 51; from 2 to 2¼ miles, 24; from 2¼ to 2½ miles, 5; total, 745.

The protection afforded include 133 crossovers in the main line, 49 crossovers leading to main line, 375 sidings, inlets and outlets, one the main line, 17 crossovers on branches and 14 sidings on branches.—*Railway Age*.

The Operation of the Scherzer Rolling Lift Bridge

Railroad Gazette, Dec. 27, 1901, p, 891.

A little time ago the Department of Bridges of the City of New York let a contract for a Scherzer bridge. Some one opposed to the use of that style of bridge made the point that it could not be opened as frequently as the requirements of the situation demanded, say about 45 times a day. To settle this point the Commissioner asked information from a number of people using these bridges.

The Chief Engineer of the New York, New Haven and Hartford said that his company has in use a six-track Scherzer bridge over Fort Point Channel, Boston; the lift span is 114 feet long and it is opened 16 times a day. It can be worked much quicker than a swing bridge and is opened in about 37 seconds. Another bridge of the same type is to be built on the New York Division at Bridgeport, over the Pequonnock River. This will be a four-track with two parallel double track lifts and a clear span of 80 feet.

The Chief Engineer of the Cleveland, Cincinnati, Chicago and St. Louis says that his company has a single track bridge with 125 feet clear opening. This is opened from 30 to 50 times a day and has been in use 15 months with no delays. A double-track bridge with the same span was opened 741 times from Oct. 15 to Nov. 23.

The Chief Engineer of the Chicago Terminal Transfer Railroad mentions a bridge with a total span of 275 feet. The openings per day average about 150. The city of Chicago has three of these bridges in operation, the largest being 60 feet wide with a clear waterway of 100 feet. The average openings are about 50 a day and there has been no more delay than with any other type of bridge. The Metropolitan Elevated of Chicago works a Scherzer bridge 40 to 50 times a day.

Probably nobody with information as to the design and performance of this type of bridge had any doubt of its efficiency, but these records from actual service are of some interest.

Creosoted Ties on English Railways

Proceedings Rocky Mountain Club, Nov., 1901.

Mr. Godfrey W. Rhodes, assistant general superintendent of the Burlington and Missouri River R. R., favored the club with a description of a recent trip to Europe. Among other things he said:

"In Europe they creosote their ties. Where we would use a wooden fence, in England they have hedges and stone walls; in some places one sees wooden fences, but they are generally creosoted. They do this to posts also and to many telegraph poles. This prevents rot. After from 20 to 30 years the ties are removed, not on account of rot, but because they are worn out. They are then sold for kindling purposes, and they get quite a good price for them. I do not understand that they ever burn their ties for waste, as we do here. In some places I saw close board fences made out of old ties. Creosote is so expensive and timber so cheap that we do not use creosote, but we are attempting to use some of the cheaper timber preservatives.

"The way a record of these ties is kept is to drive a wire flathead nail in each tie; on the nail is the year the tie was treated. We are now putting in on the Burlington a lot of treated ties and we are putting in these flatheaded nails with the figures 01, showing that they were put in in the year 1901.

"In England, in the construction of their track they use a very heavy rail. No rail is much less than 90 lbs., and a great many are 100 lbs in weight. They use ten or eleven ties to a 30-ft. rail. The reason for this is pretty apparent. Their engines and equipment are so light and the timber is so expensive, that they have to put more money in the rail and less in the ties. In this country, on account of the cheapness of the timber, we put more money in the timber and less in the rail. The result in England is that their track is wonderfully well kept up, and the heavy rails make a very easy riding track."

Locomotive Equipment, Appliances and Related Matters

Flat Spots on Driving Wheel Tires

Railway Age, Dec. 27, 1901, p. 751.

Mr. I. F. Wallace, locomotive engineer of the C., St. P., M. & O., writes the *Age*: Let us renew the history of driving wheel tires for twenty-five years past. At the beginning of this period such things as flat spots in driving wheel tires were unknown, I believe. At present the trouble is universal and chronic. Why did not the flat spots develop thirty years ago?

I claim it is speed and counterbalance combined that is the cause of all this trouble, and to substantiate my claims I will refer again to past history. Twenty-five years ago the speed of freight trains was from 12 to 20 miles an hour; of passenger trains from 20 to 30, and just as soon as the railways commenced to increase the speed of their trains these flat spots began to develop on the same engines which had been pulling the trains before, and the greater the speed the quicker flat spots would develop, other things being equal.

A mechanical engineer can design an engine having the counterweight in driving wheels equal to the weight of the reciprocating parts, and practically it will be all right standing still or revolving at a speed of from 10 or 15 miles per hour, but it is altogether different when the speed is increased to 60 or 70 miles an hour. No mechanical engineer would think of designing a high-speed stationary engine with a counterweight opposite the crank shaft and expect to have a smooth-running engine. He would simply put on a flywheel; and the heavier the rim the smoother the engine would run. This same prin-

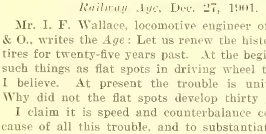


Fig 1.

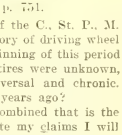


Fig 2

ciple applies to locomotive practice of to-day. Fig. 1 is a modern driving wheel with the pin on the lower quarter and the center of counterbalance on the top quarter. Imagine this is the right main wheel on a locomotive going at the rate of 60 miles per hour, the weight and angularity of the main rod on the downward thrust, the steam exerting its greatest power on the piston and the counterbalance coming over at the same time. What is the result? A hammer blow and slip. At such a high rate of speed the centrifugal force of the wheels throws the engine out of balance by having counterbalance in the wheel opposite the pin. These flat spots develop on the right wheel just ahead of the pin or near the eighth. On the left side the pin would be nearly on the quarter and that pin would be following the flat spot in the left wheel, which would occur on the quarter back of the pin. At this point on the right side is where most power is developed, and the left pin being on the center the conditions are reversed.

The thrust of the rod downward, and the counterbalance coming over at the same time, with steam exerting its power on the piston, produce a hammer blow and slip on the right side, but more of a slip than hammer blow on left side, owing to the loose condition of boxes, etc. These conditions may be reversed, but with a right-hand lead engine it is generally as I have explained. I believe my theory is also proved by the fact that the more wheels coupled and the smaller the wheels the quicker these flat spots develop, speed and other conditions being equal; also that all main tires develop flat spots first as it is on these wheels, that there is the most weight and counterweight of reciprocating parts.

My idea of a remedy is explained in Fig. 2. Take out the counterbalance, or place in the outside rim of the wheel center all the metal that is possible—the more the better. Follow out stationary practice as far as possible, and I believe it will save thousands of dollars to railways annually.

"Discovery" of Radial Trucks in America

Railway Engineer (London), Dec., 1901, p. 357.

The Brooks works of the American Locomotive Company have just put down a special planing tool for machining the sliding surfaces of the radial axle boxes with which the "Prairie" type passenger engines built for the Lake Shore and Michigan Southern Ry. are fitted. The *American Engineer and Railway Journal*, illustrates this tool and says of the radial trucks that they "appear to offer advantages over others for trailing wheels because of their simplicity, and it has even been suggested that they would probably be equally satisfactory for leading trucks as well, but they have not yet been tried for this purpose." Great Scott!

This is our contemporary's description of it: "The boxes are embodied in the ends of a casting which has radial bearing surfaces between the ends of two guide castings which are bolted to the frames and have at their ends radial surfaces corresponding with those of the box casting."

We are under the impression that both Mr. Webb and Mr. T. W. Worsdell patented a very similar appliance many years ago, and we believe that the Webb compound engine which was sent to the Pennsylvania R'd was fitted with a radial axle-box.

However, we suppose radial axle-boxes will in a few years come back to this country as a new American invention, like "equalizing" levers and other things have.

English Oil-Burning Express Engine

Railway Engineer, (London), Dec., 1901, p. 357.

We publish an engraving of the express oil-burning engine "Claud Hamilton," which is typical of the 4-coupled bogie express engines which Mr. James Holden, M. Inst. C. E., designed for the heavy express services of the Great Eastern R. The "Claud Hamilton" was exhibited at Paris, 1900, and gained a Grand Prix and Gold Medal.

As we have already published a description of these fine engines, we need not now say more than that their working continues to give entire satisfaction. A few of the leading particulars are printed below. The photograph was placed at our disposal by Mr. J. Holden, but it should be noted that these engines are now being supplied with larger tenders capable of carrying an additional 630 gallons of water, the total capacity of the tanks being 3,420 gallons.

These engines were built at the company's works at Stratford, and they are fitted to burn liquid fuel on Mr. Holden's system (which allows an engine to be readily converted into a coal burner if necessary), compressed air reversing gear, the Westinghouse brake, Stone's sight-feed lubricator, Gresham's steam sanding gear, flexible bronze fire-box stays, Macallan's variable blast-pipe, and Davies and Metcalf's exhaust steam and automatic restarting live-steam injector.

Cylinders 19 in. x 26 in. Coupled-wheels (new) 7 ft. 0 in. Centre of bogie to centre of trailing wheels 20 ft. 3 in. Height of centre line of boiler above rails 8 ft. 3 in. Heating surface 1,630.5 sq. ft. Grate area 21.3 sq. ft. Boiler pressure 180 lbs. per sq. in. Capacity of tank 2,790 gallons. Weight in working order: On the bogie 17 tons 2 cwt. 2 qrs.; on the driving wheels 16 tons 12 cwt. 1 qr.; on the trailing wheels 16 tons 11 cwt. 2 qrs. Total, 50 tons 6 cwt. 1 qr. Maximum weight of engine and tender 85 tons 7 cwt. 1qr.

Rating the Capacity of a Locomotive

Railway and Locomotive Engineering, Dec., 1901, p. 526.

We have adhered to the rating of locomotives by "cars" altogether too long in this country, though many roads are now using a tonnage basis.

In ordering a locomotive it is usually the custom to specify hauling a given number of cars up the ruling grade of the division on which it is to run, but this is not a satisfactory method to the locomotive builder. If all cars were uniform in weight or had a uniform resistance per ton, this method would probably be the simplest and best; but such is not the case.

A recent case comes to mind where a certain locomotive was not accepted, because it failed to pull the required number of cars up the ruling grade, and yet the engine had ample power if the train resistance had been no more than usually allowed for. The fault was in the cars; yet no special cars being mentioned, and the railroad referring to its own, had the right to reject the locomotive.

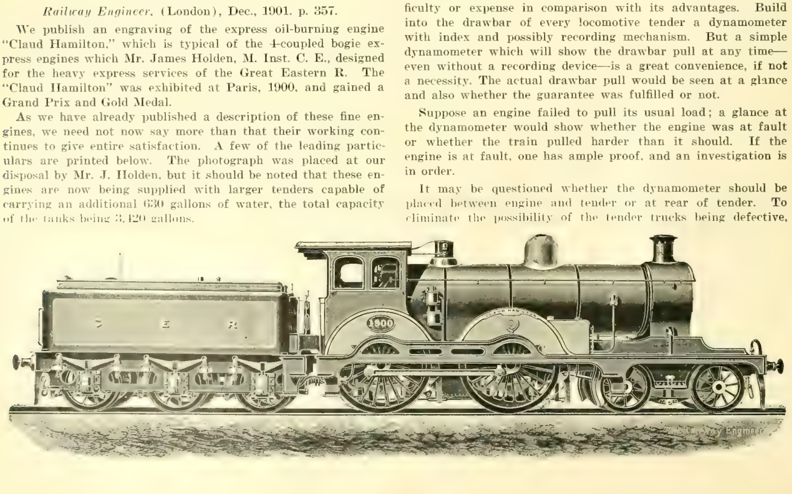
Why not get down to the root of the matter and rate engines entirely by their drawbar pull, as they should be? Why not guarantee a drawbar pull of 50,000 pounds, or whatever is wanted, and leave the question of cars to its own department, where it belongs?

If the engine develops the required drawbar pull by dynamometer and yet doesn't pull the required train, ask the car department why—the locomotive is all right.

This might be carried still further, and without much difficulty or expense in comparison with its advantages. Build into the drawbar of every locomotive tender a dynamometer with index and possibly recording mechanism. But a simple dynamometer which will show the drawbar pull at any time—even without a recording device—is a great convenience, if not a necessity. The actual drawbar pull would be seen at a glance and also whether the guarantee was fulfilled or not.

Suppose an engine failed to pull its usual load; a glance at the dynamometer would show whether the engine was at fault or whether the train pulled harder than it should. If the engine is at fault, one has ample proof, and an investigation is in order.

It may be questioned whether the dynamometer should be placed between engine and tender or at rear of tender. To eliminate the possibility of the tender trucks being defective,



the former is the correct location, but for practical purposes the proper place is behind the tender, as it is the load actually pulled that counts. It is an easier mechanical problem to make the dynamometers for this location. They need not be expensive, and ought to be money-savers on all railroads hauling great quantities of freight.

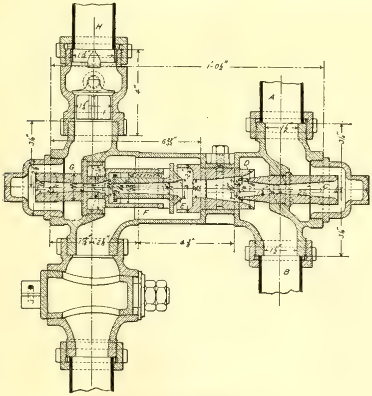
We believe that a tender drawbar which will combine a simple and reliable dynamometer would find a ready welcome after the performance of locomotives.

Canadian Pacific Injector

Railway Age, Dec. 6, 1901, p. 657.

The manufactories of the Dominion are limited in certain directions and the products of manufacture are protected by such customs duties that the large roads, like the Canadian Pacific and the Grand Trunk often find it more economical to manufacture than to buy. Among such items is an injector, shown in the accompanying engraving, which is made at the shops of the Canadian Pacific for its own use. The cost of making this injector is about one-half that of purchasing in the United States, and then paying freight and duty.

The injector is of the lifting type. Steam is admitted at A, and the water through the suction pipe at B. The steam nozzle C has a rear opening of ¾ inch, tapering to ⅜ inch at the choke. This is screwed into the body. The combining tube D has a wide, flaring opening to its full diameter of 1⅞



CANADIAN PACIFIC STANDARD INJECTOR.

inches and is held in position by a tap bolt passing through the body and tightened from the outside. The sliding nozzle, E, which is just beyond, is held centrally in position by four feathers on the outside of the tube, and has a travel of 3-16 inch before it strikes against the face of the combining tube. This sliding nozzle moves in a shell cast solid in the delivery nozzle and which opens into the overflow chamber, F. The latter opens into the overflow pipe, leading down to the ground in the ordinary manner. The delivery nozzle, G, discharges against the inside of the back cap from which point the feed flows up through the check, I, and into the boiler by way of the pipe, H.

In working out the details of this injector, care has been taken to secure the proper taper and flare in all of the nozzles and tubes in order to secure a complete commingling of the steam and water. The design also seems to secure the proper condensation of the former, and the greatest velocity of delivery with the minimum of resistance on the part of the apparatus to the flow of liquid through it.

Am. Engineer Tests Loco. Draft Appliances

American Engineer and Railroad Journal Dec., 1900, p. 384.

In order to conduct this investigation along practical lines a large amount of special apparatus is required. The first to be used is a number of draft gauges and measuring tubes for an examination and measurement of the smokebox with reference to vacuum. When this investigation is completed that of the stacks and nozzles will begin. Under the direction of Professor Goss, Professor William Forsyth has designed a series of special exhaust nozzles, seven in number, and these have been made in the shops of one of the trunk line railroads. At another railroad, the experimental stacks are being made. Of these there will be four heights, four diameters and two shapes, straight and taper. The stacks and nozzles are designed with a view of making rapid changes in running the tests. This becomes important, considering the fact that with three rates of power the number of different conditions to be studied will be 672.

It would be impossible to conduct these tests with coal as a fuel, and of necessity oil must be used. A standard locomotive fuel-oil burner has been donated by the Atchison, Topeka and Santa Fe Railway, a steam pump to be used in connection with the burner has been furnished by the Snow Steam Pump Works, and the Standard Oil Company has supplied fuel oil sufficient for the entire series. Preparations for receiving and storing the oil at the laboratory are nearing completion. These donations, and the assistance given by the railroads in making the stacks and nozzles, indicate the quality of the appreciation and endorsement the tests receive from the railroads and others. A surprising amount of interest has been shown in this work. It has led to a large correspondence from authorities on the subject, including Herr Von Borries, of Hanover, Germany, who was intimately associated with the "Hannover Tests."

The Symons Crank-Axle Locomotive

Common Carrier, Dec., 1901, p. 135.

In the last issue mention was made of the new locomotive which Mr. W. E. Symons, of the Plant System, is having built by the Baldwins. Reference was also made to the fact that M. Edouard Sauvage, the eminent French authority, had spoken highly of Mr. Symons' design.

Mr. Sauvage says, "As regards the arrangement of the cylinders, I look at it as a capital improvement over any of the present American systems of compounding, and this arrangement must, in the course of time, entirely replace other compound types. The advantage of easy and smooth running, and the economy in repairs, will largely compensate for the supplementary expense in first outlay.

"The general disposition of the engine is very good, and I have no doubt as far as I may judge from the general sketches, that the weight will be distributed between the several wheels well. Of course, the Vanderbilt boiler leaves every facility for the adjustment of the axes so as to have the best distribution of weight, the bogie taking only its own part."

The *Railroad Gazette* said: "It is a four-cylinder compound, ten wheel engine for passenger or fast freight service and will have the Vanderbilt boiler and tender. The cylinders will be compounded in accordance with Mr. S. Vauclain's latest patents for a four cylinder crank axle locomotive with one valve controlling the high and low pressure cylinders on each side of the locomotive, while the respective pistons of each pair of cylinders move in opposite directions. The high pressure pistons are inside connected to the cranks on the first axle, and the low pressure pistons are outside, connected to the second driving axle. The cylinder power will be equal to that of 19x28 in. simple cylinders. * * There is much to commend in this balanced type of compound, and a review of the subject with the references we have given will have special interest now that the main principle of so many of the French designs is to be practically tested in the United States. Mr. Vauclain has given long study to this relatively simple design, and Mr. Symons who has ordered the first engine of this type for the Plant System is a man of experience."

The *American Engineer* says: "The strides made by the locomotives in the past five years in the direction of increased capacity have been most remarkable and these have led to im-

provements in operation which are without precedent. If the limits in size and weight have not been reached in some of the magnificent productions of this time, the margins are becoming narrow and many already look askance at the big engines which are now required. But the improvements in operation to which these monsters contribute, reveal the necessity for something which is likely to be the most important influence in the future of this branch of engineering."

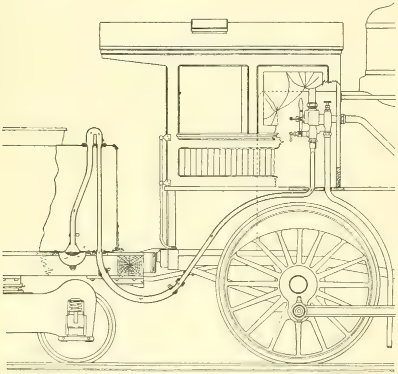
The article goes on to say that five different authorities in as many different parts of the country, replying to inquiries, gave it as their opinion that the four cylinder balanced compound offers advantages sufficient to warrant a thorough trial in this country.

Suction Pipe for Locomotives

Railway Master Mechanic, Dec., 1901, p. 395.

The accompanying drawing illustrates the application of an improved device for providing a free and ready flow of water to injectors on locomotives. As can be seen, the water has an unobstructed passage from the tank to the injector, there are no valves, and yet the engineer has perfect control of the water without moving from his seat.

This device consists of four parts only, which are made of malleable iron and threaded standard pipe size for 2 inch and 2½-in. pipe. The water is drawn from the tank in such a manner that sediment and dirt are left in the bowl and may be easily cleaned out by removing the plug in the well. The end of the pipe which is over the well, is provided with a strainer, thus preventing the entrance of any obstruction, and at the same time the free flow of water is maintained to the full capacity in the



tank. Eight wheel, 17x24 cylinder engines, with 3,850 gal. tank run 113 miles with one tank of water. This can be done for the reason that every drop of water can be used, there being no waste as is the case with the old style tank valve. It is claimed that with these syphons, an injector will run a great deal longer than with the old tank valve, for with it the injector had to be cleaned every 10,000 miles, whereas, with this device, an engine can run 20,000 miles before any cleaning is necessary.

It is true there have been some improvements in the tank valves and there have been attempts to trap the sediment, but in this device there is a radical departure from the old style practice. It would be expected that a considerable economy and increased efficiency would result from the use of this device.

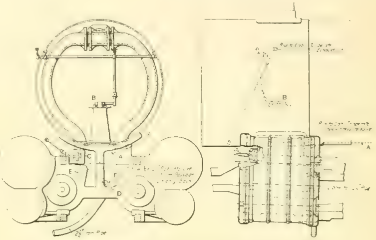
It is patented by Mr. Charles Linstrom, master mechanic of the Yazoo & Mississippi Valley R. R., at Vicksburg, and is in use on a number of railroads.

Baldwin Back-Pressure Brake

Railroad Gazette. Dec. 6, 1901. p. 840.

The accompanying illustration shows a new arrangement of automatic water brake recently brought out by the Baldwin Locomotive Works. It has been applied to a number of consolidation freight locomotives for the Colorado Midland. The cylinders of those locomotives are compounded on the Vauclain principle and are set at an angle to the horizontal center line of motion, to give greater track clearance vertically at the front end of the cylinders.

The new back pressure brake is also used on the Santa Fe. When using this brake going down grades the driver brake should be cut out so that the Westinghouse air-brake will ap-



Arrangement of Baldwin Locomotive Works Back-Pressure Brake

ply only to the tender and train. The reverse lever is put in full back motion, the small Chatelier valve in the cab is opened to supply steam to the exhaust passages of the cylinders at A, and the damper B is closed over the exhaust nozzle. Air is admitted to the exhaust passages through the inlet valve C, and the steam from the Chatelier valve will keep the cylinders from overheating and will be compressed in the cylinders and steam passages, thus retarding the motion of the pistons and wheels, through the medium of the connecting rods. As the reverse lever is in full back motion the pistons will soon pump up an air pressure in the steam passages and thus assist the retardation of engine and train. Care must be taken that the wheels do not lock, and if the rail is bad a little sand on the rail is a good thing.

The accumulated pressure can be relieved through the gate valve D which is operated by a lever in the cab and the establishment of a pressure suitable for existing conditions is therefore within control of the engineer. The speed of the engine is thus regulated by opening or closing the valve D, and a safety valve is also provided in the saddle to protect the passages against excessive pressure. This safety valve should be set to relieve at boiler pressure, or a little higher, so that no steam will escape from it when the engine is working steam.

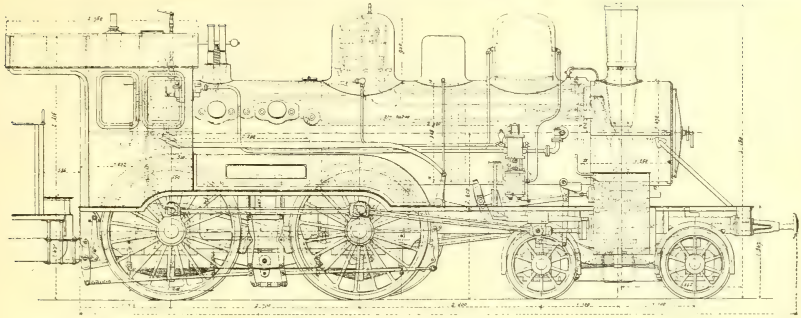
Experiments with Water Scoops on the N. Y. C.

American Engineer and Railroad Journal, Dec., 1901, p. 392.

At speeds of about 25 miles an hour it is safe to count upon getting about 2,000 gallons in a trough 1,400 feet long, of which only about 1,200 feet can be used safely. This quantity increases with the speed until the capacity of the pipe is reached, and at from 40 to 50 miles an hour about 3,500 gallons may be taken when the scoop dips into the water about 2 inches, this being the average distance, which will vary in accordance with the height of the tender and the level of the water in the tank.

It will be remembered that the new water scoop on the N. Y. C. differs from those with which many old locomotives are equipped by the omission of the top wall and hood. On the Lake Shore, the New York Central and the Pennsylvania, the practice is to omit these parts to reduce the splashing.

One of the great difficulties with track troughs is to keep them level. They must be given constant attention where water is taken from them frequently, because considerable water is wasted each time the scoop is used, and provision must be made to get this water away from the roadbed. The open-top scoop wastes much less water than do the scoops of earlier design, and hence, by their use the cost of maintenance of the track trough is very materially reduced.

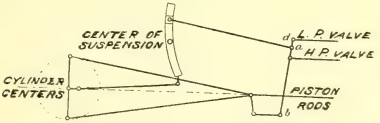


Von Borries Four-Cylinder Compound

Railway Age, Dec. 20, 1901. p. 722.

Herr August von Borries, in charge of the motive power of the Hanover State Railways, has been one of the pioneers in the development and introduction of the compound locomotive, and has probably done more systematically thorough work in that direction than any other one man.

An engine of this 4-cylinder type was exhibited by him at the Paris Exposition. Like other engines of this class, a crank axle is used with one set of cylinders between the frames, but, unlike most of the rest of its class, an independent valve motion is not used for each cylinder, so that the complication of mechanism between the frames is avoided.



The four cylinders stand in line across the engine, with their centers just in advance of the truck center. The high-pressure cylinders are between the frames and the low pressure are upon the outside. Their diameters are 12.6 and 20.5 inches, respectively, with a common piston stroke of 23.6 inches. The ratio of cylinder volumes is, therefore, as 1 to 2.48. Each pair of high and low pressure cylinders is cast in one piece, with their corresponding steam chests, and admission and exhaust passages.

The four pistons act directly upon the forward axle, which is a crank. In order to diminish as much as possible the disturbing influence of the reciprocating parts, as well as lessen the stresses upon the frames and balance the moving pieces, the cranks of the high and low pressure cylinders upon the same side are set opposite to each other.

Flat valves are used with the low-pressure cylinders. They are balanced and fitted with what we know as the Allen port. They are steadied by an extension valve stem and an excess of pressure is prevented by the use of safety valves on the steam chests.

A single piece of mechanism serves to drive the two valves on one side of the engine. The arrangement is a modification of the Walschaert valve gear.

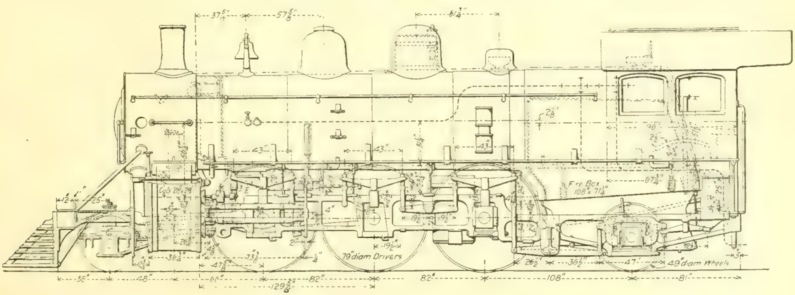
In order that the point of cut-off of the two cylinders may be different from each other for each notch of the quadrant, the points c and d at which the valve stems are attached to the advance levers, are not set at the same distance from the point of oscillation, as shown in the diagrammatic representation. The ratio of the lever arms, a c : a b. is greater for the high-pressure cylinder than side lap of the latter may be made less than that of the former, with the result that the cut-off takes place earlier in the high-pressure cylinder than it does in the low.

Baldwin Prairie Type for A. T. & S. F.

American Engineer and Railroad Journal, Dec., 1901, p. 373.

Forty-five of these engines are being built by the Baldwin Locomotive Works for the Atchison, Topeka & Santa Fe, for working passenger trains over the 16-degree curves, and grades of 184 ft. per mile such as occur between Albuquerque and La Junta. These engines have about 15 per cent. more tractive power than the most powerful previous design on this road. They each weigh 190,000 lbs. and have 3,738 sq. ft. of heating surface. The weight on driving wheels is 135,000 lbs., the same as the Lake Shore Class "J."

In comparing the heating surface and total weight of a number of recent designs, these Atchison engines head the list with



reference to the total weight divided by the heating surface, as indicated in the following table:

Name of Road.	Engine No.	Total Weight.	Total Heating Surface.	Total Weight Divided by Heating Surface.
Atchison	1,000	190,000	3,738	50.08
N. Y. Central	2,980	176,000	3,505	50.20
Lake Shore	650	174,500	3,343	52.18
C. & N. W.	1,015	160,000	3,015	53.06
L. V.	681	225,082	4,105	54.83
B. & O.	1,450	150,000	2,663	56.50
B., C., R. & N.	77	158,600	2,551	62.17
C., B & Q.	1,591	159,000	2,500	63.00
Can. Pacific	209	159,000	2,401	66.00
Penn.	820	159,000	2,401	66.00

Note.—All are passenger locomotives except that of the Lehigh Valley.

These engines will be used on the most important trains, and will undoubtedly greatly reduce the amount of mountain pusher service. Among the interesting details may be noted the use of compound cylinders, 74-in. driving wheels, wide grates, 19-ft. tubes, inside journals for the trailing wheels, bent motion bars, with rockers close to the steam chests, sloping back boiler head and front water leg, plate firebox supports, 9 by 12-in. main driving journals, 10 by 12-in. journals for the other driving axles and one of the lot of 40 engines is fitted with a traction increaser.

This is the first application of which we have record of a traction increaser for a large six-coupled engine. It is intended to increase the weight on driving wheels from 135,000 to 160,000 lbs., and for this type of engine with divided equalization, it is necessary to also divide the traction increaser. At the rear end the equalizer fulcrums are changed by a cross-bar operated by two cylinders, and a third cylinder takes weight from the front truck by means of the lever shown. This is a bold plan, which will be watched with interest. The mechanism is so arranged that the valve controlling the application of the traction increaser is operated by the reverse lever, so that it may not be applied except when working at long cut-offs. These engines have a tractive power of 27,500 lbs., which may be augmented to about 32,000 lbs. by the traction increaser and by using live steam in the low-pressure cylinders.

Car Equipment, Appliances and Related Matters

40-Ton Box Cars With End Platforms

American Engineer and Railroad Journal, Dec. 1901, p. 382.

Mr. W. S. Morris, Superintendent of Motive Power, has furnished drawings for 40-ton box cars having end platforms, built for the Chesapeake & Ohio Railway. These cars are built to the originally recommended dimensions of the American Railway Association, viz.:

Length	36 ft. 0 in.
Width	8 ft. 6 in.
Height	7 ft. 6 in.

A car 36 ft. long, 8 ft. 6 in. wide, and 8 ft. high (all inside dimensions), was originally favored by the association, but because it was subsequently stated that cars 8 ft. high (inside) could not be transported over certain lines, the height was recommended to be 7 ft. 6 in. On April 24, 1901, the association found that the objection to the higher car had been removed and at the St. Louis meeting, in October, the height of 8 ft. was adopted. These cars, therefore, do not conform to the adopted standard. The general dimensions of the cars are given in the following table:

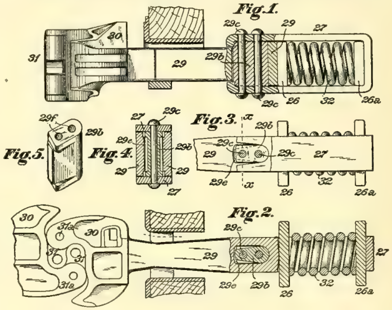
Length of framing over end sills	38 ft. 3¼ in.
Length over siding	36 ft. 10¼ in.
Length inside	36 ft. 0 in.
Length over running boards	38 ft. 2¾ in.
Width over side sills	9 ft. ¾ in.
Width over siding	9 ft. 2½ in.
Width inside	8 ft. 6 in.
Width of door opening	5 ft. 6 in.
Height between sill and plate	7 ft. 6¾ in.
Height from floor to under side of carlines	7 ft. 6 in.
Height from rail to top of running board	12 ft. 11¾ in.
Height from rail to top brake shaft	13 ft. 10¼ in.
Height from rail to eaves	12 ft. 0 in.
Height from rail to center of coupler	2 ft. 10½ in.
Center to center of trucks	26 ft. 1¾ in.
Center to center of tie timbers	6 ft. 6 in.

At the ends of the cars 8 by 11-in. oak end sills are placed outside of the car, and the truss rods, of which there are six, pass through them. These timbers are supplied with endsill cover boards and form a narrow platform at each end of the car.

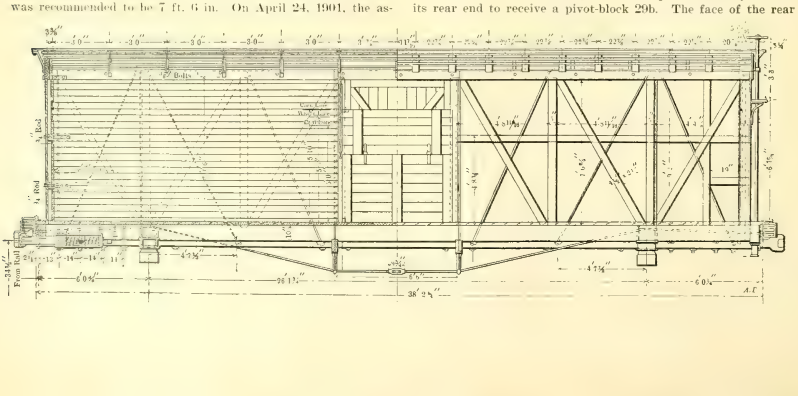
Westinghouse Draw-Gear Appliance

Railroad Herald, Dec., 1901. p. 10.

There is provided a coupler-shank or draw-bar 29, the outer end of which carries a coupler-head 30, to which a knuckle 31 is pivoted by a vertical knuckle pin 31a. The coupler-head is provided with a suitable locking-mechanism and may be of any suitable form of the B type. The coupler-shank is pivotal-



ly connected to a draft strap or yoke 27, which is adapted to surround and impart strains received by the coupler-head to a draft and buffing apparatus of any known construction, which is shown as a spring 32, interposed between front and back fellower-plates, 26 26a, fitted in the draft strap. A vertical recess 29a is formed centrally in the coupler-shank adjacent to its rear end to receive a pivot-block 29b. The face of the rear



end of the coupler-shank, which fits against the front follower-plate 26, is at and near its vertical central plane at right angles thereto and is forwardly tapered, inclined, or curved from its middle portion to each of its sides, Fig. 2. The rear end of the pivot-block is semi-cylindrical and serves as a pivot, which is of such diameter as to fit neatly on the bearing-face, formed by the rear end of the recess 29e of the coupler-shank, and it is inwardly tapered or inclined therefrom to its forward end to afford lateral clearance in the recess. Openings 29f extend vertically through the pivot-block for the reception of rivets 29c, by which it is secured to the draft-strap. The draft-strap is of U form and open at its forward end, and its upper and lower members are preferably turned inwardly to abut against the front end of the pivot-block 29b.

Under this construction it will be seen that the rear portion of the pivot-block constitutes a vertical pivot which is connected firmly but removably when desired to the draft-strap, and to which the coupler-shank 29 is coupled at its rear end, thus admitting of the employment of an open-ended draft-strap and permitting the coupler-head 30 to traverse in a horizontal plane within a properly limited range of movement when the car is passing around a curve, thereby obviating or substantially reducing the tendency to uncouple on curves of short radius. There is, therefore, a constant difference of 20 per cent. between the points of cut-off, except when these points occur very late in the stroke.

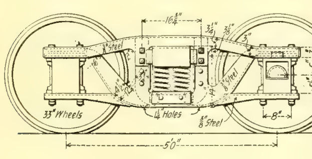
Starting is facilitated by a direct admission of live steam into the low-pressure cylinders, controlled by a small valve that is opened with the throttle valve. This admission, therefore, becomes automatic. In spite of the fact that the cranks are placed opposite each other, this arrangement permits the starting to be made without any difficulty and without shock for any and all positions of the crank.

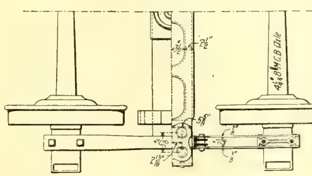
Pressed Steel Truck

American Engineer and Railroad Journal, Dec., 1901. p. 393.

Mr. M. B. Haskell, Superintendent of Motive Power of the Pere Marquette, has designed and patented the construction of pressed steel trucks, which, are illustrated in these engravings. These trucks are arranged for cast steel and also pressed steel bolsters; the latter is selected for illustration.

The object was to employ pressed steel in the arch bar type of construction, which would be simple and would not require column bolts and rivets. It is believed to be amply strong, and it employs no rivets except those attaching the spring plank to the bottom bar and those securing the short tie pieces. The





arch bar frames are of pressed steel in U section, with the flanges of both parts turned toward each other. At the ends over the boxes the upper bar is flanged to a width which permits it to cover the ends of the lower one, and a filling casting is placed between them, through which the box bolts pass. At the opening for the end of the bolster the pressed steel portions ar bolted to malleable filling blocks. These serve to stiffen the frames at these points and they also act as distance pieces for the bolts. The spring planks are also of pressed steel. From the inverted arch bar, the pieces of pressed steel extend to the boxes and receive the lower ends of the box bolts. For the side frames the steel plate is 3-8 in. thick, and for the spring plank 5-16 in. In case it is necessary to take out the bolster, the journal box bolts are removed and also those attaching the upper member of the side frame to the casting forming the connection between the upper and lower bars. This design uses 4 1-4 by 8-in. journals and will first be used under box cars. This truck is suitable for cars or tenders.

Summary of Car Building

Railroad Gazette, Dec. 27, 1901, p. 894.

During the year 1901 the various car building works in the United States will have built, altogether, 144,267 cars of all kinds, the largest output for any one year, and 20,161 more than in 1900. These figures, of course, do not include cars built by railroads at their own shops. Of the 144,267 cars 132,591 are freight, 1,949 passenger and 4,755 street cars for use in this country; and 4,359 freight, 106 passenger and 507 street cars for export. The figures for passenger cars include 202, and for street cars a few, for elevated service. Last year the total output of these works was 124,106 cars, as follows: 113,070 freight, 1,515 passenger, and 6,091 street cars for use here; and 2,561 freight, 121 passenger and 784 street cars for export. Most of the figures for both years are official, and in the absence of direct information we have estimated carefully from data which makes it certain our totals are not far from correct. In analyzing the returns it will be seen that a large proportion of the increase over last year is in freight cars, while the output of street cars is less. The primary reason for the latter is, naturally, the lack of demand by the street railroads; but some of the builders of street cars have been kept busy on heavy equipment for suburban electric and elevated surface, off-setting the decrease in orders for smaller cars. Of the 136,950 cars built for freight service, 28,143 were either all steel or had steel underframes. We do not know the exact proportion of each; but it is safe to say that nearly four-fifths are of steel throughout. Last year the totals were 14,464 all steel and 4,140 with steel underframes only. About 1,000 of the steel cars built in 1901 were sent abroad.

The Standard M. C. B. Box Car

American Engineer and Railroad Journal, Dec., 1901, p. 389.

The following resolution was recently adopted by the American Railway Association: Resolved, That the Master Car Builders' Association be requested to consider and adopt the required external dimensions of the Standard Box Car, based upon the interior dimensions as prescribed by the American Railway Association.

A standard size of 6 ft. as the width of the door openings has an important bearing upon the shipper's side of the question, for it appears that many of them find that this is a necessity. This dimension was settled upon to meet this need. With a large door they are prepared to get along with cars of the standard size.

There have been two obstacles to the standard car. First, the desire of the freight departments to build larger cars than their competitors own, as an inducement for the patronage of shippers; second, the opinion of many officials that their own practice in car design is superior to that of their neighbors. The first of these is removed by the decision of the operating and traffic officials to consider the 36-ft. car the unit for the establishment of minimum carload weights, and the second will be brought before the M. C. B. Association at its next convention. Furthermore, the American Railway Association has determined to continue its efforts and aid in the practical adoption of the standard "to the end that both the best physical and the best commercial results may be accomplished." A standard for sections of siding and flooring has already been adopted, and in settling upon the necessary exterior dimensions it will be comparatively easy to extend the standard to sills, posts, braces and other timbers. It will be necessary to

determine a standard sill spacing and construction as to trussing.

A careful examination of the dimensions of a number of cars now used successfully in general interchange, leads to the opinion that the standard inside dimensions may be provided for within the limitations of present clearances. There will be no difficulty in keeping within the limits of a width of 9 ft. 10 ins. at the eaves, and a height of 12 ft. 6 ins. from the rail to the eaves. These dimensions have already been used for years for 30-ton cars. When the side bearing vs. center plate method of support is decided, it may be possible to obtain the 8-ft. inside height, with a lower roof than is now used. It may also be possible to save several inches in height by introducing pressed steel carlines.

The New Standard Box Car

Railway and Locomotive Engineering. Dec., 1901, p. 526.

For a long time there has been an agitation going on among railway officials in favor of establishing dimensions for a standard box car. The Master Car Builders' Association labored zealously over the desirability of such a standard, and there was but very little diversity of opinion about the advantages that would accrue to railroad companies from the adoption of such a standard, but it appeared impossible to bring about agreement concerning details.

That was the condition of affairs when the American Railway Association determined to take up the question. The diversity of opinion among railroad mechanical officials concerning the proper dimensions of a standard box car were by no means the greatest difficulty that stood in the way of a settlement. The traffic representatives manifested a very keen interest in the size of the future standard, and it required to bring about a settlement, the action of an influential body like the American Railway Association, which is composed principally of railway presidents, general managers, and other officials, whose views obtained immediate consideration. A committee was appointed to report on the most acceptable dimensions for a standard box car. A report submitted at a meeting last April was not considered satisfactory. But at a meeting held in St. Louis in October last, when a membership representing 194,955 miles of railroad was present, a second report on dimensions of a standard car was submitted and accepted. The leading dimensions are 36 feet in length, 8 feet 6 inches in width, and 8 feet in height. That will be the future standard and there are indications that the leading railroad companies will specify nothing else when they are ordering freight cars. A significant coincidence about this standard car is that the dimensions are precisely the same as those of the Pennsylvania Railroad box car. Those familiar with the reports and discussions at the Master Car Builders' Association will remember that coincidences of this kind are by no means new.

The standard box car will have an inside capacity of 2,448 cubic feet. If the whole of the space should be filled with wheat it will hold 1,967 bushels, which at 60 pounds to the bushel will weight 118,020 pounds. With land producing 30 bushels to the acre it will take the crop from 65½ acres to fill the car. A train containing fifty of these cars so loaded would carry away the product of 3,275 acres.

Failure of Wheels Under High-Capacity Freight Cars

Railway and Engineering Review, Dec. 27, 1901, p. 785.

J. H. G. writes the *Review*: The wheel-makers have performed wonders for these heavy all-steel cars, whereas the spring-makers have done their utmost to ruin both cars and wheels. The wheels are amply strong enough for these cars if they had an arrangement of springs that would protect them from being operated under cars that are run on practically dead axles. The wheels are not ruined by the full loads, but by the empty car bodies. If we inspect the crude arrangement for carrying the varying loads from 40,000 lbs. to 150,000 lbs. or from empty car to maximum load, we will find that the only time the springs approach their sensitive point or where they just poise the load, is when the car is fully loaded. Even then the spring-maker has reserved a safe margin in the spring so that it will not close up at this tremendous load, for if it closed it would break and then the car would be on a dead axle for a certainty. Running with dead axles is the very thing they are doing all the time the car is empty.

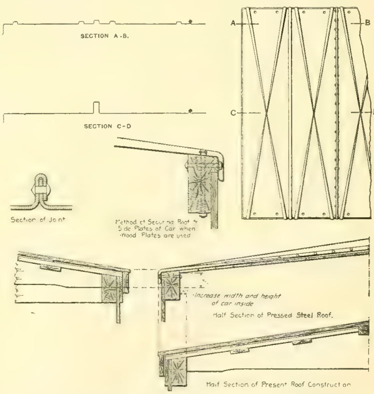
If, then, the spiral only becomes sensitive at 150,000 or 170,000 lbs., what spring nature will it possess when 100,000 or 120,000 lbs. of load has been removed, leaving only the empty car body and truck frames? What must be the effect upon the wheels of suddenly changing the cushioning of the spirals to practically solid blocks. When the car is running, the body is jumping and bouncing along for miles without any devices to absorb the thrusts the wheels meet in passing over frogs, switches and diamond crossings. Such usage would ruin even a steel tired wheel if it was under one of these cars.

Again, note the effect of the brakes when the car is loaded, the springs being at their sensitive point, give readily when the shoes are applied, thereby relieving the wheels of the terrific thrust they receive when the car is empty; and as the brake shoes, levers, and rods make a solid connection between wheels and body, the wheels are still further burdened by the vibrations that are set up and which naturally find their way to the ground, through the wheels.

A Pressed Steel Car Roof

Railroad Gazette, Dec. 20, 1901, p. 872.

In two recent issues of the *Gazette* (Sept. 27 and Nov. 22) the pressed steel carline designed by Mr. B. Haskell, Superintendent of Motive Power of the Pere Marquette, was illustrated. It was shown that with given inside dimensions of box cars the height of the car at the eaves is reduced 2 in. by using carlines of pressed steel. Now Mr. G. B. Maltby, draftsman in Mr. Haskell's office, with a similar object in view, has designed and patented a pressed steel car roof which eliminates the carlines.



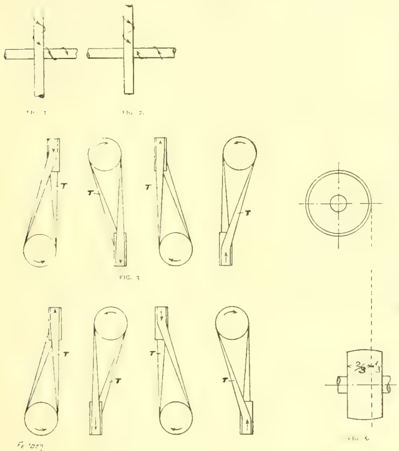
The roof consists of sections of 1-8-in. steel the width of the car and pressed so as to give the required stiffness. The form of the overlapping joint between adjacent sheets is shown in detail, as is also the method of fastening the roof to the wooden side plates. At the middle of each section the sheet is pressed into an inverted U which projects above the roof surface and takes the place of the ordinary carline. A wooden strip is fitted into this projection from below to which the ceiling is nailed. As this projecting ridge gradually increases in depth from the eaves to the middle of the car the diagonal projections are made to decrease in depth toward the middle, so that each section of roof can be made from a rectangular plate. The steel plates are turned down at the eaves so as to cover the siding and take the place of the facia boards. It is apparent that with given outside dimensions, the pressed steel roof permits of a considerable increase over the usual width and height inside.

Shop Practice, Machinery and Tools

Proper Arrangement of Quarter-Twist Belts

Feilden's Magazine, Nov., 1901, p. 496.

In considering the relative directions of rotation of belt driven shafting, two non-intersecting shafts at right angles may be combined in two different ways. These are shown in Figs. 1 and 2. Any two actual shafts, if looked at in a particular direction, will be represented either by Fig. 1 or by Fig. 2. For each of these combinations there is only one method of arranging the pulleys and belt, for a drive without guide pulleys. Fig. 3 shows the arrangement for the combination of shafts indicated in Fig. 1, while Fig. 4 illustrates that corresponding to Fig. 2. In each case four views are given. If Fig. 1 be considered to be a plan, then the four views in Fig. 3



are four elevations taken in order at right angles to each other. The four views in Fig. 4 correspond similarly to Fig. 2. If the upper pulley be the driver, the side of the belt marked T is, in all the views, the tight side. The lower pulley may, however, equally well be the driver. In that case the pulleys will revolve in the same direction as shown, but T will indicate the slack side of the belt. The exact positions of the pulleys on their shafts should be ascertained by trial as they are affected by the relative sizes and relative distance apart of the pulleys. The general arrangement is to make the tangent from one pulley overlap the breadth of the other about two-thirds. The one condition to be observed in the arrangement of pulleys of this kind is that the point where the belt leaves each pulley, shall be in the plane of the other pulley.

Belt-Driven Flue Welder

Railroad Gazette, Dec. 29, 1901, p. 877.

This machine is driven by a belt and friction clutch at the rear, one man only being required for its operation. It is run at 125 to 135 revolutions a minute and from 12 to 15 revolutions are usually sufficient to weld a flue, so the capacity depends upon how fast the flues can be heated and handled. These machines, built in three styles, can be used for flues ranging from 1¼ to 4 in. in diam. A complete set of tools are furnished for scarfing and these tools are kept in the box formed in the base of the machine.

The mandrels are finished so the flue is a nice fit when cold, and when heated for welding the flue goes on easily. The swedges or hammers also conform to the flue, so that when welded the flue is finished smooth and true to size inside and outside. The machine is automatic and ramming the flue on the mandrel for welding starts the machine, the flue being turned and the two hammers operated together. When scarfing, one hammer only is used. In working the machine by hand the rear bracket and clutch are removed and a crank is substituted.

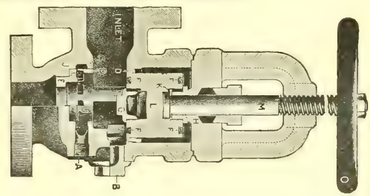
The machine ready for shipping weighs 650 lbs., and it requires a floor space 18 in. square and is made by Maddocks & Herschell, Princeton, Ind. Many of them are now being used in railroad shops.

New Boiler Blow-Off Valve

Engineering News, Dec. 12, 1901, p. 460.

The design of a boiler blow-off valve or cock which shall always be tight when closed and never give trouble in opening or closing, is one which has balked many engineers. From its position the blow-off valve is exposed to scale, sediment, grit and everything which is naturally expected to cause valves and cocks to leak and stick. But a leaky blow-off valve is not only wasteful but dangerous, for the loss of water, while the boiler is shut down and the fires are banked may proceed to a serious extent. Still more serious is the predicament of the engineer who opens the blow-off cock, and when he attempts to shut it finds that a piece of scale has lodged on the seat; or if it is a cock it may stick, as cocks are prone to do, and the handle may break off when it is half open or closed. These things make many engineers loth to use the blow-off except as necessity compels and they allow boilers to accumulate scale by blowing off at too long intervals.

A blow-off valve intended to obviate these defects has been designed by the Lunkenheimer Co. and is shown in vertical section in the accompanying cut. The main feature of the valve is the use of an auxiliary steam supply which blows the bearing surface clean as the main valve approaches its seat. The construction and operation of the valve are described as follows by the manufacturers:



The steam inlet A connects with an annular passage C. The iron body of the valve has a brass casing D with a circular slot J cut into its side, just below the level of the seat E. The casing D is held in place in the valve body by the seat ring E screwing over it, both of which are removable at any time for repairs or replacement. The opening A is connected to the steam space of the boiler and a suitable valve interposed. The object of this steam inlet A is to admit steam to C and J, and discharging from the latter blows across the seat, which will clean off any scale or sediment that may have accumulated on it, so that the disk and seat bearing, when in contact, will be perfectly clean.

To close the valve, the disk is screwed down in the usual manner. As it approaches the level of the inlet the edge of the disk passing the lower edge of the casing D cuts off a great deal of the flow of water, sediment, etc. At this time the valve in the steam pipe leading to inlet A should be opened and the steam admitted to the annular space C, from whence it passes through slot J and blows off the entire surface of the seat E. In the meantime the disk is being screwed home to the seat, which cuts off the flow of steam from inlet A as well as the blow-off from the boiler.

Hammering Out Bulges in Boilers

Steam Engineering, Dec., 1901, p. 121.

A correspondent signing himself "J. J. F." writes *Steam Engineering* as follows: It seems a little strange in these days of high boiler pressure that in some, if not many, instances

steel boiler sheets have been overheated and become slightly bulged or bagged, they have been hammered back as nearly to the original shape as possible. Sometimes the parts to be hammered are prepared by having pieces of red-hot iron placed on them, while in the more aggravated cases a fire of charcoal is built around the bag and maintained until the sheet becomes red hot, when the fire is removed and the hammering begins. The process of heating, reheating and hammering goes on until the person doing the work is satisfied that the sheet is in the proper place, when water is thrown on the hot sheet for the purpose of tempering it.

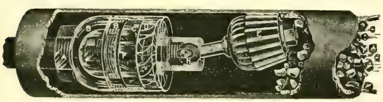
This may be a more common and successful practice than I imagine; however, I apprehend that considerable risk is taken, unless the work is in the hands of a very skilful person, thoroughly familiar with the nature of the metal he is dealing with. And this is more especially the case when charcoal is used to do the heating, for every engineer knows that a charcoal fire will soften steel, and a man must be an expert indeed who is able to heat and reheat a steel boiler sheet while in place and get the proper temper without detriment to the metal.

It may be well enough, under certain circumstances, when a boiler sheet has been slightly bulged, to apply red-hot irons and drive it back to place; but when a sheet has been bagged and the bag is so deep that it cannot be driven back without a charcoal fire, my choice would be a patch in preference to having a weak part in the boiler caused by softening of the metal by a charcoal fire. I do not know that an accident has ever occurred as the result of the practice here mentioned, neither have I any information on the subject except that gained by observation; but I *do* know that locomotive and stationary boilers are sometimes treated in this way and I hope the subject is of sufficient interest to call for the opinions of some of your readers.

The Atlas Boiler Tube Cleaner

Iron Age, Dec. 19, 1901. p. 3.

The Atlas boiler tube cleaner consists of a motor designed to run either by water or steam and which operates a cutter for removing the scale. The motor is a miniature water wheel, D, of the turbine type. Connected with this is the shaft F, formed at one end with the toggle joint H, which unites with the cutter shaft G. The water enters at A into the chamber B, from which it passes through the ports C to the turbine blades.



The cutter is thus made to revolve at a high rate of speed and its impact against the tube dislodges the scale, which is washed out through the tube by the water. This tube cleaner, made by the Atlas Pipe Wrench Company, 121 Liberty St., New York, is designed to work at any pressure from 60 lbs. to 150 pounds. Boilers with scale 1-4 inch thick on the back end of 18-foot tubes have been cleaned at the rate of five minutes for each tube.

Jefferson Flange and Union Joint

Steam Engineering, Dec., 1901. p. 128.

It is a matter of common knowledge among pipe fitters and others having to do with the erection of pipes that a slight inaccuracy in alignment of pipes joined together by flanges or unions will often cause a troublesome leak and necessitate the bending of the pipes or the making of a special gasket to stop the leak.

To obviate this fault of ordinary pipe fittings, and make easy the erection of pipes, for any one of ordinary skill, the Jefferson Manufacturing Company, 186 Devonshire St., Boston, Mass., are making the pipe flange and joint illustrated in Figs. 2 and 3 in various sizes up to 3 inches. The construction of these fittings is such that a slight lack of alignment will not prevent the making of a tight joint. The flange fitting

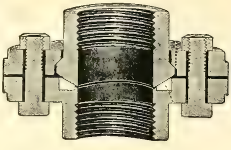


Fig. 2.

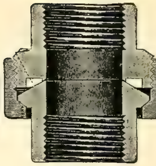


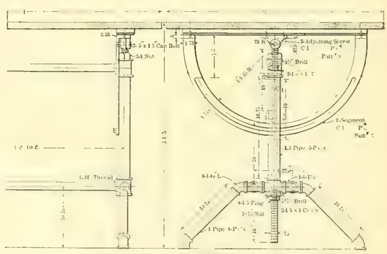
Fig. 3.

consists of one part which screws on the pipe and which carries a bronze seat concaved to fit the spherical end of the mating part. The mating part screws on the other pipe and is encircled by a ring which bears on a ball shoulder joint. When the parts are drawn together by the flange bolts, the ball-shaped parts adjust themselves even where there is considerable variation of alignment and yet make a tight joint. The principle of the union shown in Fig. 3 is the same as that of the flange.

Draftsman's Table Made of Iron Pipe

American Machinist, Dec. 26, 1901, p. 1428.

In the drawing office of the new works of the Franklin (Pa.) Air Compressor Company they have drawing tables which are at least as neat and efficient as any we have ever seen and at the same time they are made mostly out of stock materials. The stand was designed by Mr. Webb, the superintendent, when he was acting as chief draftsman. The engraving made from the working drawing shows the construction so clearly as to leave little to say in the way of explanation. The segments and the adjusting screw yokes are the only parts requiring patterns to be made for them and every other part is a commercial article except the adjusting screws which are threaded



on a bolt-cutter. It is to be noticed that the segments are large enough to give very firm support to the table and the draftsman can lean as much of his weight upon it as he chooses without danger of anything slipping. No finish is put upon the segments; they are used as they come from the sand. The stands are painted white and present a very neat appearance. In use they have proved as good as they look. Mr. John Grant has adopted the same table in the drafting room of his new works, but has replaced the upper nuts on the adjusting screws with sprocket wheels, which are connected by a chain, so that the two screws are adjusted together. This, of course, adds to the convenience of the arrangement and probably causes the height of the table to be changed a good many times when it otherwise would not be.

Nothing Like Accuracy

Inquisitive old gentleman.—"Did you make the kite all by yourself?"

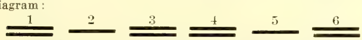
Truthful little boy.—"Hardly, sir. Both the paper and string are the products of American industry. My part in the construction of the kite was merely that of a mechanic who utilized the material already prepared."

Electric Equipment, Machinery and Appliances

Electric Equipment of the Manhattan Elevated

Railroad Gazette Dec. 13, 1901, p. 852.

The apportionment of motors will be two motors to each of four cars in every six-car train, the make-up of the train being as follows: Car No. 1, head end, motors; car No. 2, a trailer; cars Nos. 3 and 4, motors; car No. 5, a trailer; and car No. 6, a motor car. This train make-up is shown in the diagram:



Trains of five cars will no longer be used in the service and it is therefore apparent that, when in the rush or slack hours of the traffic it is necessary to increase or reduce the number of cars the yard work will be extremely simple. The first reduction from a six-car train will consist of cutting off a motor car and one trailer from one end of the train, thus reducing the regular day service to trains of four cars, three of which will be motor cars. When it becomes necessary to use the three-car train service the motor car which we have referred to in the order of location as No. 3 or No. 4 (as the train may head) will be detached and run into the yard. There will be no further occasion for reduction of the number of cars until the hours of the midnight service are reached, when the first switching operation at the yard will be necessary and the trailer referred to as Car No. 5, or No. 2, will be switched out and the midnight service will consist of trains of two motor cars.

One big engine and generator and the boilers are practically complete and the second engine and generator are in the power house and well along toward complete installation. The first shipment of the 300 new cars ordered from the Wason Mfg. Co., Springfield, Mass., and the American Car & Foundry Co., Wilmington, Del., has been received in New York and shipments will continue steadily until all of the cars are received. The third-rail work on the Second and Third avenue lines is done, and on the Sixth and Ninth avenue lines it is well under way. The Second avenue line will receive current and go into regular operation first.

Light Distribution from Incandescent Lamps

Electrical Review, Dec. 7, 1901, p. 703.

In the accompanying diagrams are shown some results presented by Mr. Francis W. Wilcox before the last annual meeting of the National Electric Light Association. Mr. Wilcox, in studying the effective distribution of light from incandescent lamps, brought out very clearly the large influence which is exerted by the shape of the filament. In Fig. 1 herewith is shown the horizontal and vertical distribution from a double-loop or twin-filament lamp, and in Figs. 2, 3 and 4 are shown, respectively, the distribution from oval anchored filament, double-oil filament and spiral-filament lamps. It will be noted that in the latter case the distribution is shown as uniform in all directions.

A lamp of this type has lately been manufactured and put on the market by the Sterling Electrical Manufacturing Company, of Warren, Ohio. The lamps are made in the usual voltages and candle-powers and with the usual standard bases to fit the various types of sockets.

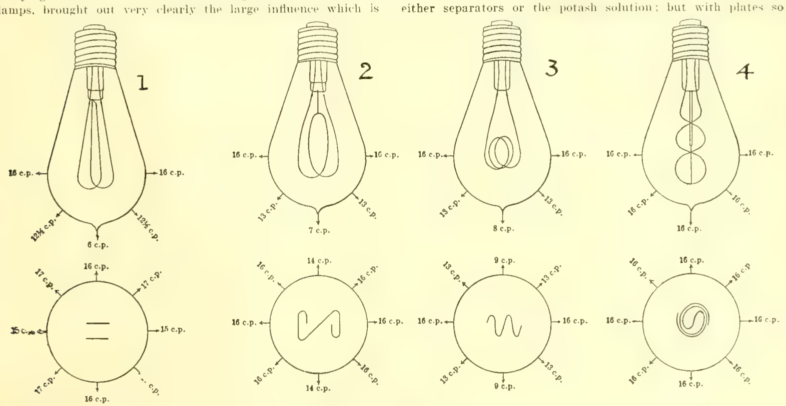
The Edison Storage Battery

Electrical World and Engineer, Nov. 30, 1901, p. 896.

Interest has again been stimulated by the loan exhibit at the automobile show of a complete cell of the battery. The cell was 12 inches high, 2 inches thick, 5 inches wide, and weighed 7½ lbs., giving 120 watt-hours, or 46 lbs. per horse-power-hour. The cell was also shown in its detail parts, and the steel plates excited much comment and surprise, being in sharp contrast to the familiar ones of lead.

Last June note was made of the formation of the Edison Storage Battery Company, with a capital of $1,000,000, and since then reference has been made to the establishment of a factory at Glen Ridge, N. J., for the production of the battery. At this present moment, the Glen Ridge factory is so far advanced that the manufacture of batteries will begin with the new year, and deliveries should come early in the spring.

When interviewed on the subject last week, Mr. Edison expressed himself with the firmest conviction as to the real success he has attained in the new battery. Analyzing the cost of electric automobile operations, he pointed out that by far the largest percentage of cost lay in the element of depreciation. Under the most rigorous tests, subjected to the severest usage that such an appliance could ever be supposed to endure in actual service, the element of depreciation, as shown by the records, appears to have dwindled to an inappreciable minimum. These tests now extend virtually over a couple of years, but are still being persisted in, with the object of determining any weakness, wherever it may lurk. As to the cost of the cell, Mr. Edison proposes to market it somewhere around the present cost of lead batteries. So far as can be ascertained, the type of cell noted above is the standard. It would appear that for stationary work far larger grids can be used; indeed, there is said to be no valid reason why they should not be 10 ft. high, or even as big as the side of a house. For separators between the plates, several successful types have been used, some of which are quite original. As a matter af fact the cell is so full of plates there is little room provided for either separators or the potash solution; but with plates so



thin—one-tenth of an inch all told—the separators are naturally thin to be in keeping. The containing boxes are of steel. The weight of the solution is put at not to exceed 20 per cent. of the plate weight.

Electrical High-Speed Experiments at Berlin

Consular Reports, Dec. 5, 1901, p. 2.

The current supply is transmitted at high voltage from Oberschonweide, on the River Spree above Berlin, across to Marienfelde for the high-speed electrical railway experiments. The actual tests began at the end of September on the stretch of standard-gauge track between Marienfelde and Zossen. They have been from the first carefully guarded from public observation, and no technical account of the difficulties encountered and results attained will be accessible until the full official report of the engineers in charge of the experiments shall be published. From entirely trustworthy sources, information has been obtained, from time to time, on the basis of which it can be stated that during the first few days the speed attained did not exceed 55.9 miles per hour. This was gradually increased until the record showed a pace of 93.2 miles per hour, which, according to the best information that can be obtained, is considered the practicable limit of advisable speed with the equipment. Above that velocity the increasing danger of derailment and the tremendous strain upon track and rolling stock would, it is believed, outweigh the advantages of higher speed with the machinery now available. It is therefore understood that the experiments are suspended at least until some radical changes, suggested by this experience, may be made in the construction of motors and other details of the apparatus.

The official report, when it shall appear, will be replete with new and interesting data for electrical scientists. The motors although in at least one instance "burnt out" by the powerful current, have apparently done all that was expected of them, and the expected difficulty of "getting the current into the car" from a triple overhead wire seems to have been successfully overcome. The other anticipated obstacle—air resistance—proved less serious than was expected. The maximum pressure registered by the instruments placed in front of the cars was approximately 16.7 pounds per square foot.

Accident on the Liverpool Overhead Ry.

New York Tribune, Dec. 25, 1901, p. 6.

An accident precisely like that which recently occurred on the elevated road in Liverpool is utterly without a parallel in the past, and certainly should remain so in the future. Cars have repeatedly taken fire from the burning out of a fuse before this. It was only an exceptional combination of circumstances which led to a different result in England's great seaport. The train was inclosed in a tunnel, the motive machinery ceased to operate rather suddenly from some cause, and it so happened that a large quantity of creosoted wooden ties had been stored in the tunnel.

Neither the first nor the second of these factors in the situation would have counted for much had it not been for the third. Fire having been communicated from one of the cars to the ties, the tunnel was converted into a furnace from which escape was practically impossible. There can be no excuse for using a tunnel for the storage of timber destined for service on another part of the line. Had not this mistake been made in the subway through which the Liverpool elevated railway extends, there is every reason to believe the disaster would have been averted.

Electricians have long been urging the lesson here taught upon the attention of railroad managers, but not with complete success. A fuse is a bit of soft wire introduced into an electric circuit in such a way that if an excessive amount of current is turned on the filament will melt, and by interrupting the flow prevent harm to the costly mechanism of the motor. When a fuse melts a powerful spark is produced at the gap, and thus the adjacent woodwork is liable to take fire. Such a possibility is a constant source of danger. Here, perhaps is the weakest point in an otherwise admirable system of traction.

There are at least two good ways in which the difficulty may be met. The immediate surroundings of the fuse box, if not the whole front end of the car, might be constructed of steel or other absolutely incombustible material. Or a different device for protecting the motor might be adopted.

Conducting Transportation

To Discourage Train Robbers

The management of the Burlington has decided to go after train robbers in a way that will prove effective. They have adopted the plan of offering a standing reward of $1,000 for the frustration of such depredations or for the capture or killing of a train robber. As a result of this policy being adopted, all the train men of the system go armed. These facts alone, by being made public, will have a tendency to induce highwaymen to seek safer fields for operation or go out of the business altogether. Whenever a train robber feels that a large sum of money is hanging over his head while in certain localities or on certain lines, it is only natural that he should be disposed to go elsewhere to prosecute his trade.—*Railway Journal*, St. Louis.

English and American Coal Trains

Engineering and Mining Journal, Dec. 14, 1901, p. 779.

The contrast between English and American railroad methods in handling coal is shown in a striking light by a report which we find in recent English exchanges. The London & North Western Company, which the largest carrier of mineral traffic in the United Kingdom, coal furnishing over 60 per cent. of its freight traffic—and which, it may be noted, is the only British company which reports ton-mileage and train-mileage fully—last year reports an average coal train load of 100 tons only. This is only a little over one-fifth of the train-load carried on our more important coal roads, the Norfolk & Western reporting last year an average of 461 tons, while the Chesapeake & Ohio and the Pennsylvania were still higher. The London & North Western charges nearly three times as much as our roads, its average mineral rate being 1.4 cents per ton-mile, but complaints are made that the coal rates are too low for profit. No wonder we are told that the company is considering the question of using heavier rolling stock, for which its road-bed is well suited.

Would Per Diem Cure?

Railway Age, Dec. 6, 1901, p. 656.

Mr. W. A. Gardner, general manager of the C. & N. W. R'y, writes the *Age*, somewhat as follows:

Are the railways themselves entirely responsible for car detention? This query does not embrace misuse. Will a per diem charge inspire railway officials with supernatural zeal, or will it coerce or be a factor in inducing brokers and others to provide suitable track and warehouse facilities?

If one has leisure and inclination, he will discover a sympathetic ratio between the increased capacity of rolling stock and increased detention in loading and unloading; an exhibit of earnings per car, however, as between 1890 and 1900 might be a factor in reconciling us with some current conditions. The country elevator and coal bin have scarcely kept pace with modern car construction, and we who collect grain from a thousand sources know that eternal vigilance is the only insurance for utilizing car capacity. Gondolas, or coal carrying cars, make less mileage in the West, at least, than any other type. This applies not so particularly, perhaps, to the home road, upon whose rails coal is mined, but to its connections, where the fuel is sold and unloaded for use. Coal roads are very properly discomforted by the inequality in mileage made by their neighbors, as between box and gondolas.

Unquestionably, per diem would place all classes of equipment upon a parity, from a standpoint of payment for delay, but are we prepared to subscribe to an innovation that makes one railway responsible to another for the disabilities of the general public, or accept punishment because the plausible sales agent or genial traveling freight agent of a connection have been artful enough to forward more freight in one day than the consignee can unload in ten? The chairman of an important English railway recently stated that the introduc-

tion of freight equipment of large capacity by his company was in no little measure governed and dependent upon revolutionizing facilities by their patrons.

The Northwestern Company receive at Chicago daily three hundred switch cars from connecting lines. Average time under ordinary conditions is eight days from date of receipt to return delivery. During this period, with few exceptions, car service does not accrue. We, therefore, have in yards awaiting room and opportunity to place on private tracks, concentrating empties for return, and in transit, upward of 2,000 foreign cars. We receive for this service a carload rate. Considering the yard space required, and other conditions, the transaction of itself is not remunerative. Shall we be further taxed a per diem for the privilege of providing our neighbors with valuable terminals? The suggestion to compensate this and similar conditions, by the application of differential division of rates, etc., looks inviting, but we fear that its complexity would only result in its being but a temporary expedient.

There is one type of depravity that most of us are unable to cope with. I refer to the lines chartered under general railway laws but whose identity with railway customs, courtesy and traditions, appears to cease at birth. The fact that they themselves own little or no equipment does not deter them from nursing, and maturing a distinctly local business. They are seemingly unconscious of any impropriety in retiring one's car from service for a period of 30 to 90 days, and they are equally indifferent to importunities for the return of property. Some punishment will undoubtedly be found to fit this crime. Per diem, however, would be their harbor of refuge and haven of rest.

The Train Staff on the Reading

Railroad Gazette, Dec. 6, 1901, p. 841.

The Philadelphia & Reading has lately introduced the Union Switch & Signal Company's electric train staff, on a short section of single track, using the new-style instruments, in which the staff is only 6 inches long.

There are two staff instruments, one each at Buck Mountain and Mahanoy Tunnel. There are 15 staffs in use in each machine, or a total of 30. The bell signals prescribed for used in connection with the staff system are those adopted by the American Railway Association for the "controlled manual block system," with the addition of one signal for switching movements. After giving the prescribed signals and getting a release of a staff, it is necessary to remove the staff from the instrument, and with it unlock the lever controlling the semaphore signal, before it is possible to give a clear signal. As there is another line besides this one, between East Mahanoy Junction and West Milton, the traffic varies from time to time; at one time there will be an accumulation of staffs at Buck Mountain and again at Mahanoy Tunnel. The excess staffs are then transferred to the opposite station by the signal repairman; the signalman not being able to remove staffs except in the orderly operation of the system.

Staffs are delivered and received direct from engineman to signalman and vice versa, while trains are running about eight miles an hour, and as trains are not allowed to exceed 12 miles an hour through the tunnel, this reduction in speed is not seriously felt. Experiments are, however, being made with devices for delivering and receiving the staffs at a higher rate of speed.

It is estimated that the capacity of the single track line through the tunnel has been increased 30 per cent.

The Check System of Handling Baggage

Transport (London), Dec. 6, 1901, p. 475.

In Col. Constable's report to the government of India on the Working of American Railways, he says of baggage handling methods, that: "The check system is excellent for long journeys, and there can be no difficulty in adopting it when and where required, as it consists simply in having duplicate metal numbers provided with straps, one label being hung on the article and the other given to the passenger. But nothing will persuade me that the system is as cheap and convenient or as prompt in action as the English system for short journeys in England, and when America has cheap cabs and labor, passengers, with the aid of a porter, will probably look after their own luggage, and will never let it out of their sight except when it is in the luggage van. I am aware that Americans think differently, but until pilfering of baggage becomes a common practice in England I can see no necessity for the check system. Express companies in America, according to my painful experience, should be severely let alone, and Americans will give you this same advice, certainly if you want your luggage sharp. Unfortunately for me I "expressed" my baggage three times from a hotel in New York to one in Baltimore, and on one occasion I could not get it for 48 hours, as it arrived on Sunday instead of Saturday, and no delivery is made on the sabbath. On the second occasion I lost it for 27 hours, and on the third I would have had the same experience had not an influential railway official got it through in eight hours.

"I think all this work had much better be done by the railway companies themselves as they do in England, and the former should then get more than 40 per cent. of the net profit, which is, I undertsand, their share now. The public, too, would be more promptly served and the exorbitant charges would, I believe, disappear. But here again, the secretary of the Railway Association, with whom I corresponded on the subject, differs from me, and he thinks that transfer companies (not express companies, whom he says should be shunned for despatch work) do the work cheaply and expeditiously, and he considers that railway companies could not undertake the work themselves. But I still think the cheap cab will come in America, and at any rate until a transfer company will deliver your luggage at the station nearly as fast as you can get there yourself by a street car, which it does not do now, requiring two or three hours to effect this operation, I cannot admit that the service is satisfactory. We are accustomed in England to make use of our baggage up to the last moment, and it is inconvenient to have to arrange for its removal and make it over some hours before starting for the station."

Medical and Surgical Matters

Treatment for Electric Shock

Railway Surgeon, Dec, 1901, p. 208.

The *Railway Surgeon* quotes from the *Journal Electro-Therapeutics*, and gives the method of treatment for victims of electric shock accidents as officially promulgated by the police department of Paris, France:

1. Whenever a person is injured by the falling down of, or from contact with, an electric wire, those present must not under any circumstances touch the electric wire with their hands.

2. It is important to release the victim from the wire as soon as possible, and a piece of dry wood (broomstick, for example) will serve the purpose. This should be done with the greatest precaution. With the same piece of wood the wire can then be pushed aside, if it obstructs the way.

3. The central power house, through the nearest telephone or police station, should then be notified to stop the current, and the nearest physician called, who will treat the patient similarly to a drowned person.

The following recommendations should be given the widest publicity and be attached to the electric supply posts and all places where the accidental falling of an electric wire can cause injury. Although the instructions state that the physician will treat the patient like a drowned person, the bystanders need not await the arrival of the doctor before giving assistance to the stunned patient.

The victim is removed from the place of accident, the neck and chest freed, and resuscitation is then attempted by any of the following methods:

RHYTHMICAL TRACTION OF THE TONGUE

(1) The patient is placed on the back; the head slightly turned to one side.

(2) The jaws are opened; separating them by force, if necessary.

(3) The tongue is seized between the thumb and index finger with a handkerchief or cloth.

(4) The tongue is forcibly drawn out of the mouth, repeating twenty times per minute. Do not be afraid to draw it out too strongly; it is necessary that at each traction the jaws be opened wide, and that the tongue protrudes entirely beyond the mouth.

(5) These movements of traction of the tongue should be continued with persistence for at least one hour.

N. B.—If the operator becomes confused by the number of tractions, he can regulate the number by his own respiration and perform traction on the tongue of the patient with each respiration of his own.

The appearance of hiccough or vomiting is a favorable sign; when it occurs, it is necessary to continue the tractions on the tongue for a long time.

ARTIFICIAL RESPIRATION

The patient is placed on his back, the shoulders slightly elevated, the mouth opened, and the tongue well drawn out. The following methods are employed:

(1) The arm of the patient is grasped at the elbow and brought firmly against the side of the thorax. Then the elbows are moved upward above the head, describing the arc of a circle, and lastly, bring them back to their first position and press firmly against the side of the thorax. Repeat these movements about twenty times per minute, and continue until respiration is re-established.

(2) Place the hands flat upon the inferior and lateral parts of the thorax, using vigorous pressure, and letting go immediately after the pressure. Repeat these movements about twenty times per minute, continuing same until normal respiration supervenes.

These methods, while probably well known to many practitioners, should receive wide circulation, and the Paris authorities should be emulated by those of other municipalities, as proper public knowledge of the above technique will no doubt save many lives.

[The treatment outlined above is, of course, applicable to persons who have been struck by lightning. In the instructions issued by the general manager of the Liverpool Overhead Railway—DIGEST for May, p. 192—it was pointed out that bystanders, if unable to shut off the current, might temporarily short circuit it, by the use of a piece of wire or an iron rod or bar. Great care, however, must be exercised by the rescuer, not to place himself in circuit by so doing. When the rythmical traction of the tongue is practiced, the Liverpool instructions advise wedging open the patient's mouth, so that he cannot bite his own tongue or the hand of the rescuer.—Ed. RAILROAD DIGEST.]

Midland Engineers' Ambulance Classes

Transport (London), Dec. 13, 1901, p. 507.

Certificates and medallions were recently presented to the successful competitors of the London district of the Midland Railway Engineers' ambulance classes. The presentation was made by the Rt. Hon. Lord Farrer, a director of the company, and among those present were a number of prominent officials and Drs. J. Haynes and A. H. Robinson.

His lordship first congratulated the meeting on its magnificent dimensions, and expressed his delight that the staff of the company took such great interest in the ambulance movement. There had been a most gratifying increase in the number of qualified ambulance men in the engineer's department, rising from 208 in the year 1894 to 1,500 in 1901. Dr. Haynes spoke of the nobleness of the desire of working men to give up their spare time to qualify themselves to help their fellow creatures in time of need. Dr. Robinson also spoke of the value and importance of the work, and his pleasure at finding it become popular. Votes of thanks to the honorary surgeon instructors were proposed, a further vote of thanks was tendered to the local secretaries of the classes.

There were 218 successful students, of whom 159 passed the first examination, 56 obtained the re-examination certificate, and 3 passed the final examinations, securing the medallion.

Received 1,000 Volts and Lived

New York Tribune, Jan. 1, 1902, p. 10.

Irving Austin, twenty-six years old, an electrician employed by the Westchester Lighting Company, while repairing a wire yesterday, received nearly a thousand volts of electricity through his body. Austin was standing on a platform handling a live wire when he accidentally fell and struck a car track, completing the circuit. Before he could let go of the wire the current passed entirely through his body. His fingers were burned nearly to a crisp and he was unconscious for some time.

A Stretcher in a Lamp Post

Railway Surgeon, Dec., 1901, p. 209.

An ambulance in a lamp post is the latest idea in street contrivances. Paris has just been endowed with several specimens of what is called a "spare de secours," or First Aid lighthouse. It consists of an ornamental bronze pillar about fifteen feet high, with a round, overhanging top resembling that of a lighthouse, and containing a clock face, barometer and three transparent pictorial advertisements, revolved by clockwork and lighted by gas from within. In the base of the pillar is a letter box, and in the shaft is a folding stretcher, with printed directions for affording First Aid to the injured. In case of a street accident the stretcher can be immediately obtained by breaking a small glass window just above the letter box, taking out the key, and unlocking the receptacle.

[Some such arrangement as this might be very useful in a large railway station, or other busy point where switching of cars is done. There might also be an "emergency box" kept with the stretcher; in fact, the idea as outlined above, is capable of very considerable development.—Ed. RAILROAD DIGEST.]

Miscellaneous

Relation of Technical Papers to the Engineering Profession

Street Railway Journal, Nov. 30, 1901, p. 773.

Prof. Hibbard, of Cornell, delivered an address to the Society of Mechanical Engineers at Sibley College on the advantages of the systematic reading of current engineering literature. Although addressed to students in a technical college, the remarks apply with equal force to the active worker in the field to whom a knowledge of current development and improvements in his particular industry is equally important. As Prof. Hibbard says, "A good engineering paper should be one of the life partners, ready at hand when moments of leisure permit its instruction and enjoyment, better understood and liked as the years roll on, acquaintance or perhaps friendship formed with editor, contributions made, suggestions given and taken; some share had in its mighty influence in the engineering world." In any industry which is progressive, and this applies to all branches of engineering, it is impossible to cover in any text book the knowledge which a person actively engaged in the business requires in his work, as much of the practice by the time that it is compiled in a book has become antiquated. Many managers of railway and other engineering properties appreciate this fact, and the advantage of keeping their heads of departments informed as to the improvements in operation, and have made a practice of calling the attention of their superintendents to articles which appear in the technical papers particularly relating to their respective departments. No better plan can be followed, where such a thing is possible, than for a number of persons interested in the technical side of the property to have a regular time of meeting, and engage in the interchange of opinions on technical subjects.

The value of the technical paper does not close with the perusal of it. Any of the articles printed are often those for which the reader has not any immediate application, but to which later he would gladly refer if he could quickly turn to

them. For this reason, a system of indexing the most important articles which appear in the technical publications which a person reads is often the most valuable asset in his professional library. Suggestions as to the method which Prof. Hibbard has found most convenient in card indexing are contained in his paper, and this plan certainly has many advantages over that of preserving clippings. Undoubtedly the index plan for the reading pages and the clipping plan for the advertisements which are to be preserved will often prove the most satisfactory method of preserving and making available this class of literature.

Malleable Cast Iron

Mechanical Engineer (London), Nov. 23, 1901, p. 685.

This is an extract from a series of articles on the Metallurgy of Iron by Prof. A. Humboldt Sexton. He says, the process of making malleable cast iron is apparently the converse of that of case hardening, and consists in softening the surface of cast-iron articles by heating in oxydizing material. The castings are made of iron which must contain but little graphitic carbon, though the combined carbon should be fairly high, and there must be but little silicon. The castings must be well cleaned, and are then carefully packed in iron boxes surrounded by iron scale, powdered hematite or other suitable material, iron scale being the best, as the ore mentioned, frequently contains earthy matters. The boxes containing the cast-iron articles are covered with sand and clay so as to exclude air, and are subjected to a high temperature, of course below the melting point of cast iron, and are kept for a week or more at uniform temperature, and are then allowed to cool slowly. An iron must be selected which contains but little free graphite, or the resulting material will be porous. White iron or mottled iron are used as they are free from impurities. Hematite pig or, in America, charcoal pig are usually used.

Th depth of the decarbonization depends on the time of heating, which may vary from a day to two weeks. The conversion may be to only a small depth or entirely through the piece. The malleable casting has a higher tenacity then grey iron, but less than wrought iron or mild steel. It cannot be welded, but contains sufficient carbon to allow of its being hardened by quenching. At a moderate red heat it is possible to forge some of the best qualities, but if it is overheated it crumbles as soon as struck.

It has been questioned whether the action is as much one of deoxidation as usually supposed, it being suggested that the carbon is converted into finely diffused graphite.

"Let Us Have Peace"

Railroad Gazette, Dec. 27, 1901, p. 890.

At the recent meeting in New York of the Industrial Department of the National Civic Federation it was decided to form a committee of 36 to advise some means whereby the relations between capital and labor may be improved and strikes averted or settled. The following committee was appointed:

REPRESENTING CAPITAL

United States Senator M. A. Hanna, of Ohio.
Chas. M. Schwab, President of the United States Steel Corporation.
S. C. Callaway, President of the American Locomotive Co.
C. A. Moore, of Manning, Maxwell & Moore, President of the National Tool Co.
J. D. Rockefeller, Jr., representing the Standard Oil Co. and allied interests.
H. H. Vreeland, President of the Metropolitan Street Railway Co., of New York.
Lewis Nixon, President of the Crescent Ship Yard Co.
James E. Chambers, President of the American Glass Co.
W. H. Pfahler, President of the National Association of Stove Manufacturers.
Julius Kruttschnitt, assistant to the President of the Southern Pacific Railroad.
E. P. Ripley, President of the Atchison, Topeka & Santa Fe Railroad.
Marcus Marks, President of the National Association of Clothing Manufacturers.

REPRESENTING LABOR

Samuel Gompers, President of the American Federation of Labor.
John Mitchell, President of the United Mine Workers of America.
F. P. Sargent, Grand Master of the Brotherhood of Locomotive Firemen.
T. J. Shaffer, President of the Amalgamated Association of Iron, Steel & Tin Workers.
James Duncan, Secretary of the Granite Cutters' National Association.
Martin Fox, President of the Iron Molders of America.
J. E. Lynch, President of the International Typographical Union.
Edward E. Clark, Grand Conductor of the Order of Railroad Conductors.
Henry White, Secretary of the Garment Workers of America.
Walter Macarthur, editor of the *Coast Seaman's Journal* of San Francisco.
James O'Connell, President of the International Association of Machinists.

REPRESENTING THE PUBLIC

Grover Cleveland, former President of the United States.
Archbishop John Ireland, of the Roman Catholic Church.
Bishop H. C. Potter, of the Episcopal Church.
Cornelius N. Bliss, former Secretary of the Interior.
Charles Francis Adams, of Boston, former President of the Union Pacific Railroad.
Charles W. Eliot, President of Harvard University.
Franklin McVeagh, of Chicago, attorney.
James H. Eckels, former Comptroller of Currency of the United States.
John J. McCook, of New York, attorney.
John G. Milburn, of Buffalo, attorney.
Charles J. Bonaparte, of Baltimore, attorney.
Oscar S. Straus, of New York, President of the National Civic Federation.

The committee was organized with the following officers: M. A. Hanna, Chirman; Samuel Gompers, First Vice-Chairman; Oscar S. Straus, Second Vice-Chairman; Charles A. Moore, Treasurer; Ralph M. Easley, Secretary.

Compulsory Arbitration in Australia

New York Commercial Advertiser, Nov. 9, 1901, p. 7.

The Industrial Arbitration bill which has just been passed by New South Wales is in every respect a notable event in the history of labor. According to the dispatches the bill is a thorough-going compulsory arbitration law, and has evidently been modelled upon the law of New Zealand, which all our labor leaders with Socialist inclinations have often referred to as an almost ideal measure in the interests of justice between employer and employee. The new bill compels reference of all disputes between employers and employees to a competent court, with power to enforce its orders and awards. A strike or lockout, before such reference is to be a misdemeanor, punishable by fine or imprisonment. The court which is to pass upon these disputes is to be presided over by a justice of the Supreme Court; there is to be no appeal from its decisions, and it is to have the power of declaring a standard wage and to give preference to unionists over non-unionist laborers.

The powers lodged in the new court are doubtless accounted for by the political strength of the labor party, which has indoctrinated the whole Australian electorate with advanced notions as to government interference with industry. The broad significance of the measure is in the fact that regulation of the relations between employer and employees has been made part of the established administration of the civil and criminal law. A dispute is, by the mere fact of discovery, made amenable to a court of law for final settlement. Disobedience to that court's orders makes the offender liable to damages or to a criminal penalty, as the case may be.

It has been said that a manufacturer there has a good deal of business zeal taken out of him by the apprehension that he will be interfered with and "put right" by a court which sometimes miscalculates his interests and hampers him by vexatious conditions. Dissatisfaction of some kind under such a system is inevitable, but there has hardly been sufficient experience under the law to fix its character permanently. In speaking of the development of industry its relation to state control is now increasingly difficult and urgent, and the Australians in their daring attempts are experimenting for the instruction of the whole world.

Governmental Railways of the World

Railway and Locomotive Engineering, Dec., 1901, p. 514.

The mileage of the governmental railroads of the world is far greater than many realize and presents some interesting figures, which are given by a good authority. The enormous mileage of the German state roads give us a better idea of the extent and development of the German Empire than almost anything else would do.

The proportion of locomotives to miles of railway is also interesting from its variety. The frequency of train service affects this very materially.

When we see the large mileage and the number of locomotives in such countries as India, and realize the climatic conditions, to say nothing of the fondness of lions, tigers, etc., for engineers, we marvel at the enterprise of the Anglo-Saxon in penetrating these countries. Miles away from the seaport, which in a way connects them with home, they live and work amid strange surroundings and stranger people, helping, perhaps unconsciously, to make the English-speaking people predominant the world over.

	Cont. Miles Broad.	Locomotives.
EUROPE.		
Austria	6,300	2,314
Belgium	3,318	3,009
Bulgaria	931	56
Denmark	1,167	434
Finland	1,645	268
France	1,748	576
Germany	28,935	15,177
Hungary	8,580	2,364
Norway	463	73
Portugal	527	82
Roumania	1,920	441
Russia	15,780	4,942
Servia	335	63
Sweden	2,305	542
	73,654	30,341
ASIA.		
Borneo	100	10
Ceylon	297	92
China	530	85
Dutch Indies:		
Java	914	262
Sumatra	131	61
India	20,082	3,953
Native and Guaranteed	2,395	117
Japan	3,157	1,006
Malay Peninsula	286	47
Siam	225	20
	28,117	5,653
AFRICA.		
Cape of Good Hope	2,000	492
Egypt	1,222	413
Soudan	886	60
Mauritius	104	40
Natal	585	129
Orange State	2,418	68
Transvaal	1,100	235
	4,315	1,437
AUSTRALIA.		
New South Wales	2,706	491
New Zealond	2,090	293
Queensland	2,797	326
So. Australia	1,743	355
Tasmania	438	66
Victoria	3,143	517
W. Australia	1,355	230
	14,272	2,278
CANADA.		
Intercolonial	1,315	228
Prince Edward Island	210	23
	1,525	251
Totals	121,883	37,960

Steam Pipe Covering Tests

Electrical World and Engineer, Dec. 7, 1901, p. 945.

Some interesting tests have been made by Mr. George H. Barrus at the Manhattan Railway power house, New York, on condensation in bare and covered steam piping. The tests were made at two pressures—80 and 150 lbs.—and every precaution was taken to exclude extraneous factors from the results. Many of the coverings were tested day after day for a period of a month, and every one was subjected to at least three days' run of 8 to 9 hours' continuous test each day. The piping in one set of tests was 2 inches in diameter and 100 feet long, and in other tests 10 inches in diameter and 35 feet long. With the 2-inch piping and at 80 lbs. pressure, the condensation per hour without covering was 60.30 lbs. maximum and 55.75 lbs. minimum. Of five coverings applied, the condensation varied from 14.07 lbs. maximum and 13.46 lbs. minimum in the case of the lowest, to 15.14 lbs. and 14.60 lbs. for the highest. At 150 lbs. pressure the condensation uncovered was 72.20 lbs. and 71.75 lbs., and covered 10.93 lbs. and 10.47 lbs. for the best of four kinds of coverings, and 14.00 lbs. and 13.18 lbs. for the lowest of the tests. The 10-inch pipe was subjected only to 150 lbs. pressure, at which the condensation bare was 112 lbs. per hour maximum, and 105.9 lbs. minimum. Four kinds of coverings were tested on the large piping, from which the best results were 11.67 lbs. and 11.07 lbs., and poorest, 15.93 lbs. and 15.79 lbs.

Tests of Steam Pipe Coverings

Engineering and Mining Journal, Dec. 14, 1901, p. 793.

For 2-in. coverings, 80-lbs. pressure: 1. Johns' Asbestocel. 2. New York Air Cell. 3. Carey's Moulded. 4. Johns' Moulded. 5. Gast's Ambler Air Cell.

For 2-in. coverings, 150 lbs. pressure: 1. Johns' Asbesto-sponge Hair Felt, 3-ply. 2. Johns' Asbestos-sponge Hair Felt, 2-ply. 3. Asbesto-sponge Felted (sectional). 4. K. & M. Magnesia (85 per cent. carbonate of magnesia). 5. Asbestos Fire Felt (Navy brand).

For 10-in. coverings, 150-lbs. pressure: 1 Johns' Asbesto-sponge Felted. 2. K. & M. Magnesia (85 per cent. carbonate of magnesia). 3. Asbestos Fire Felt (Navy brand). 4. Watson's Imperial.

The minimum and maximum rates of condensation per hour for each of the coverings tested was as follows:

For 2-in. coverings, 80-lbs. pressure, length of test pipes 100 ft.: Johns' Asbestocel, from minimum, 13.46 to maximum 14.07. New York Air Cell, 13.88 to 14.14. Carey's Moulded, 14.18 to 15. Johns' Moulded, 14.15 to 15.07. Gast's Ambler Air Cell, 14.60 to 15.14.

For 2-in. coverings, 150-lbs. pressure, length of test pipes 100 ft.: Johns' Asbesto-sponge Hair Felt, 3-ply, 10.47 to 10.93. Johns' Asbesto-sponge Hair Felt, 2-ply, 11.21 to 11.29. Asbesto-sponge Felted (sectional), 11.20 to 11.57. K. & M. Magnesia (85 per cent. carbonate of magnesia), 11.64 to 12.20. Asbestos Fire Felt (Navy brand), 13.18 to 14.

For 10-in. coverings, 150-lbs. pressure, length of test pipes 35 ft.: Johns' Asbesto-sponge Felted, 10.67 to 11.07. K. & M. Magnesia (85 per cent. carbonate of magnesia), 13 to 13.64. Asbestos Fire Felt (Navy brand), 14 to 14.64. Watson's Imperial, 15.79 to 15.93.

For bare pipes: 2-in., 80-lbs. pressure, 55.75 to 60.30; 2-inch. 150-lbs. pressure, 71.78 to 72.20; 10-in., 150-lbs. pressure, 105.9 to 112.

Graining Grounds

Master Painter, Dec., 1901, p. 2.

For ground-work for oak, add best French yellow ochre to pure white lead, making a buffish color, then add a little raw umber, to impart the natural woody tone. For lighter oak use chrome yellow instead of ochre, and omit umber. For darker oak add to the first mixture Venetian red and a little burnt umber. This answers for pollard or knotted oak also. Green oak is made by glazing over ordinary light oak graining with a thin wash of chrome green. For black or very antique oak, glaze over ordinary oak with a thin wash of lamp black. These glazes may be in oil, and brushed out well with the bristle brush.

Ash ground is a trifle less yellow than that for light oak, and a little raw umber is necessary. For Hungarian ash, add a little chrome yellow.

For chestnut ground, same as for ash, but deeper color and with the addition of a little red.

For maple, a very light ground is essential. To 2-3 of a paint pot of lead well broken up add about a teaspoonful of chrome yellow and about half as much burnt sienna, or a very little Venetian red. The idea is to get the ground as near the color of the lightest part of the natural wood as possible.

For satin wood use a similar ground, making it deeper in color, if anything.

Burl ash requires a ground a trifle deeper than for ash.

Cherry ground may be made much like that for ash, using raw sienna instead of ochre and umber. This for natural cherry. For stained cherry the ground must be made by staining yellow ochre with Venetian red. The darker shades of stained cherry will not require any lead, but lighter shades will take some lead. Never use Indian red in a ground work, as it is not transparent and will make the job look muddy. On old work, for cherry or walnut, it is well to add some red lead to the color, keeping it stirred occasionally.

The ground work for walnut is made by taking yellow ochre for the base, and adding a small quantity of Venetian red and a little burnt umber, adding a little lead for light walnut.

For mahogany the ground is made of yellow ochre, Venetian red and red lead.

For rosewood ground use chrome yellow, red lead, and a small quantity of Venetian red.

For cypress, which much resembles yellow pine as to grain, the ground is slightly darker and more yellow than that used for oak.

Hard or yellow pine requires a ground much the same as for oak, being slightly yellower.

Whitewood demands a ground about the same as ash.

Formation of Varnish and Resins

Trade Journal's Review (London), Dec. 14, 1901, p. 15.

That the formation of varnish is not due to oxidation, as is usually considered, but to polymerization, formed the subject of a paper read by Dr. Kronstein at the Hamburg meeting of German naturalists and doctors. He proved his point by the discovery of an intermediate product which invariably consists of 12 molecules. He arrived at the same conclusion with regard to "Linoxin," which represents the highest degree of polymerization of linseed oil. Resins were also referred to, and he mentioned that he had succeeded for the first time in producing synthetically a resin identical in physical and chemical properties with resins occurring in Nature. An artificial resin produced by the new method was perfectly identical with natural amber, both in color and hardness. Basing his conclusions on the results of numerous experiments, he advanced a new theory of resin production, which is also applicable to the soft resins and balsams.

The *Gummi Zeitung* says the practical man will not fail to gauge the importance of this discovery, and queries if it may not lead up to something new in the chemistry of caoutchouc and of caoutchouc vulcanization.

Doctoring Boilers

Age of Steel, Dec., 1901, p. 15.

Mr. Charles H. Fitch contributes this article; he says:

An active circulation embracing all the water space of the boiler preserves plates from overheating and burning out through formation of scale.

Mr. W. E. Snyder in a paper before the Engineers' Society of Western Pennsylvania, says that the has "seen in ordinary two-flue and return tubular boilers deposits of loose scale and sediment directly over the bridge wall, varying in quantity from a peck to two or three bushels, while the remainder of the surface would be practically clean. The circulation in this case would be sweeping the entire boiler with the exception of directly over the hottest part of the fire, where the current would be directly upward, while the scale would be deposited in a heap, its presence frequently not being suspected until a large bag appeared in the shell."

And there is one rule for all. Here is one of these cases cited by Mr. Snyder, a bag in the shell or crown-sheet of a boiler. What shall we do about it? Summon a boiler doctor, and let him poultice it, and put on a thicker patch in plate? One might as well put a patch on the outside of the boiler house wall. We must have a correct theory. There are two essential facts, the composition of the water, and how its elements are thrown down and the hour they go into combination with steel plate under conditions of heat, and the manner of circulation of the water in the boiler.

At the bridge wall is a very hot spot where the flames drive against the shell. Beyond is a comparatively cool place. Further back and above there is the portion of the boiler heated strongly by a nest of tubes with return gases. The current rises from the hot place at the bridge wall and is drawn toward the hot place at the nest of return tubes. It leaps so to speak from the bottom of the boiler at the bridge wall, over the cooler and comparatively quiescent body of water behind the bridge wall, and right there where the current turns up, it dumps its pecks and bushels of scale. It is a complete unloading system, as though it were devised for the purpose.

We cannot consider the defects of a boiler properly, or design it or inspect it properly without giving thought to circulation, the main thing being not to have it baffled, not to have any stops or hitches in the continuous flow embracing every portion of the water space.

This governs the point and direction of feed which should be so made that the circulation will be helped and not hindered by it, and that it will not make an eddy or pocket of quiescent water anywhere. At the bridge wall the temperature of furnace gases may be 1,340 deg. F., as actually found in an experiment by J. C. Hoadley on a 5 foot diameter by 21 feet long return tubular boiler, the temperature at pier back of bridge was 895 deg. F. We can easily see that an abrupt change in the temperature of the source of heat would lead to a rise of current and a dumping place at the corresponding point inside the boiler even if there was considerable activity in the eddy so formed, and that the introduction of feed water at the lower back end of the boiler would aggravate the trouble.

Robert Fulton

Iron Age, Dec. 12, 1901, p. 5.

Robert Fulton was born in Lancaster County, Pennsylvania, in 1765. An at early age he evinced talent as an artist, and by the time he was 21 had achieved such success in painting that he was able to buy a farm for his widowed mother. On the advice of friends, he then went to England to seek aid from the famous American, Benjamin West, in the further development of his talent for painting. Soon making the acquaintance of several men of science and mechanical ability, the spirit of his true genius—that of mechanics—which had been sleeping, awoke.

Generally speaking, Fulton's claims as the first inventor of the practical steamboat cannot be disputed. As a rule, a great mechanical invention is the outgrowth of the combined efforts of several inventors of more than one nation, and in a general sense may be said to be common scientific knowledge; but to the man who actually makes a commercial success of an invention due credit always must be given. Fulton commercially created the steamboat.

There can be no doubt of Fulton's power of originality, which, (besides being evinced by his work of proportioning the machinery to the hull of his vessels, and by the improvements which he made to each successive boat as it was built) may be seen in the work of his whole life, which was in great part taken up with invention and the projection of plans for the world's welfare. Fulton possessed scientific knowledge and practical skill, was a progressive engineer, and his great work in the establishment and subsequent improvement of the commercial steamboat was built upon a firm foundation. In this method we note the most careful procedure and the most approved ways and means to attain the results desired. He did not trust to vague theory, but worked out all details and thoroughly tried everything that might be in doubt before attempting to introduce it into actual use.

Exasperating

Grimes.—Confound it, that's just my plaguey luck.

Boyd.—What's the matter, Grimes?

Grimes.—Matter enough. There's going to be a reduction of fares on my railroad, and I've just got an annual pass on it. —*Boston Transcript.*

Railroad Patents

A Record of Patents recently granted for Railroad Appliances.

Compiled by STEBBINS & WRIGHT, Patent Attorneys, Washington, D.C., and 727 Walnut Street, Philadelphia, Pa.

A copy of any U. S. Patent will be mailed to any address by Stebbins & Wright for five cents, the fixed Government charge.

Process of Making Car Wheels, Etc.

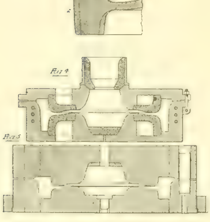
No. 687,590.

SAMUEL M. VAUCLAIN, of Philadelphia, and Archy A. Stevenson, of Burnham, Pennsylvania, assignors to the Standard Steel Works, of Burnham, Pennsylvania, a corporation of Pennsylvania.

The object of the invention is to manufacture a steel wheel having sufficient strength to withstand the rough usage and the strains to which car-wheels are now subjected. It has been found that the ordinary cast-iron wheels tend to disintegrate under the heavy strains and pressures to hich they are now subjected, owing to the increased weight and tonnage of both freight and passenger cars used on steam-roads.

In the accompanying drawing, Fig. 1 is a sectional view of a cast wheel-blank. Fig. 2 is a sectional view of the finished wheel made from the blank. Fig. 3 is a diagram view of the rim of the wheel enlarged, showing the finished wheel in full lines and the wheel-blank in dotted lines. Fig. 4 is a sectional view of one form of mold for making the blank shown in Fig. 1, and Fig. 5 is a view of one form of die for compressing the blank to the finished wheel as shown in Fig. 2.

In the manufacture of steel wheels it has been impracticable to make a perfect wheel with sufficient metal at the rim without making the wheel too heavy for ordinary use and considerably increasing the expense. Wheels made of cast-steel are often imperfect, owing to the fact that pipes are formed in the thickened rim portion and hub, and these pipes are not detected until the tests are made or a fracture occurs, and for this reason the use of steel wheels has been condemned in numerous cases.



In carrying out our invention we make a casting in a mold—such, for instance, as the mold shown in Fig. 4—in which the blank A, Fig. 1, has a hub-section a, a rim-section a', and a plate or spoke-section a^2. It will be noticed that the rim-section a' is much wider than the finished wheel shown in Fig. 2 and the hub is much longer. The thickness of the rim and the thickness of the hub are much less than the finished wheel—that is, these parts are thinner in the blank than in the finished wheel—so that while there is the same amount of metal in the one as in the other the blank is of such a thickness at the rim and hub that very little, if any, pipe will be present when the blank cools. The difference between the blank and the finished wheel is readily seen in the diagram Fig. 3, and we take this blank, reheat it, and place it between the dies (one form is shown in Fig. 5) and strike it a number of blows or subject it to hydraulic pressure, which will displace and compress the metal at the rim and hub, so that it will be a solid homogeneous mass of the shape illustrated in Fig. 2, the width of the rim and hub being decreased and the thickness increased.

We have found by a number of tests where a defective casting was made originally that by our process we were enabled to make a solid homogeneous wheel which was able to withstand the severe usage to which a wheel at the present time is subjected.

We have shown and described a method by which the hub as well as the rim of the wheel is reduced. In some instances the rim only may be reduced, where the hub is so designed as to prevent piping, and also in some instances the hub may be only reduced, leaving the rim in its original condition.

It will be understood that while we have shown our invention as applied to the flanges and hubs of car-wheels the process may be used in manufacturing other wheels and rings, a cast-steel ring being made wide and thin and condensed and the width decreased and the thickness increased by subjecting the blank to pressure.

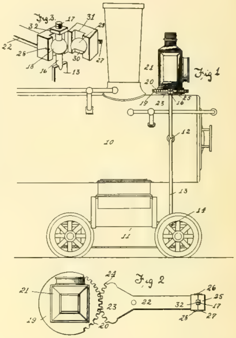
We may allow the cast blank to cool and then reheat the blank before subjecting it to pressure or we may take the cast blank directly from the mold and subject it to pressure, if it found desirable.

Automatic Headlight-Directing Device

No. 687,964.

JOSEPHIEN JOSLEN AND GEORGE A. JOSLEN, of Des Moines, Iowa.

Locomotive-engines are usually provided with headlights firmly fixed to the front end of portion thereof, and hence when the engine is rounding a curve in the track the rays from the headlight do not illuminate the track. We have observed in rounding a curve the front truck of the locomotive stands at an angle relative to the longitudinal movement of the locomotive.



Our object is to provide a pivoted headlight and simple, durable, and inexpensive means whereby the forward or backward movement of one side of the front truck of the locomotive-engine relative to the boiler will operate to turn the pivoted headlight in the proper direction for throwing the rays of light upon the track when the engine is rounding a curve.

A further object is to provide a device of this class that will not be affected by the vertical movements of the boiler and the front truck relative to each other and the levers for operating the headlight will not be bent or broken by such movements.

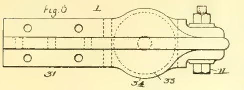
Wright Car Truck

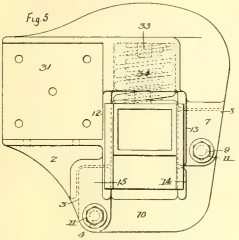
No. 686,794.

This invention consists broadly in forming the truck transoms of flanged beams, rolled, cast, or of pressed metal, securing to the transom besides flanged side pieces, and attaching to the ends of the side frames cast metal pedestals.

While the drawing shows transoms with bent ends the invention embraces transoms with straight ends secured to the side pieces adjacent their centers.

The object of the invention is the production of a truck made of commercial shaped and with pedestals which can easily be replaced should one become bent or broken. The patent shows several examples of the application of the principle

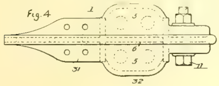


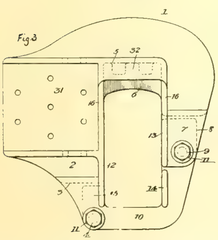


No. 686,794.

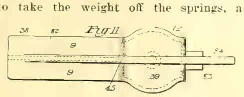
This invention involves a modification of the construction shown in patent No. 686,794.

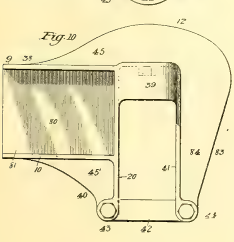
The main feature of novelty relates to the pedestals, made of cast metal, and





provided with a removable end piece, whereby when the said piece is removed and the frame is jacked up far enough to take the weight off the springs, a

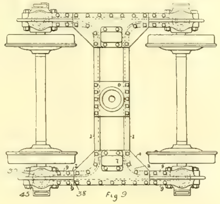


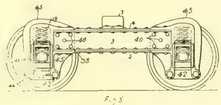


pair of wheels and an axle can be rolled out.

No. 686,796.

This patent illustrates novel shapes of cast metal pedestals. The outer jaw extends downwardly and ends adjacent the side of the journal box. The tie bar being removed and the frame jacked up so the end of the outer jaw is above the





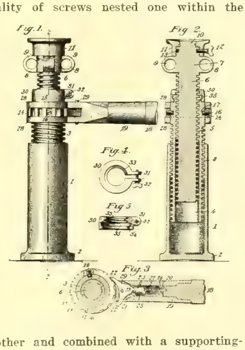
top of the journal box, a pair of wheels can be removed without taking the truck from under the car. A nested spring or separately disposed springs can be used. The short outer pedestal jaw takes the strains in service, and should the tie bar become broken or even removed the wheels and axle would remain in place.

Lifting-Jack

No. 688,012.

ROBERT S. BERGER, of Granere, Pennsylvania.

The object of the present invention is to provide a screw-jack embodying a plurality of screws nested one within the



other and combined with a supporting-base and casing and an operating-lever, the screws being so related to each other and combined with a clamp-collar that a differential feed may be obtained by the employment of one or both of the screws. The change from single to double feed may be quickly effected, thus adapting the jack to a variety of uses.

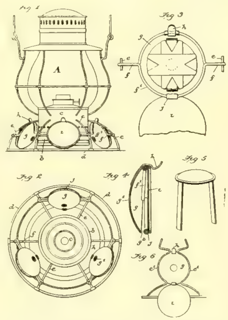
In a screw-jack, the combination with a supporting-casing, and a pair of screws nested one within the other and mounted in the casing; of an operating lever having a pawl-and-ratchet engagement with one of the screws, and a clamp-collar having a swiveled engagement with one screw and a threaded engagement with the other screw, the threads of the clamp-collar corresponding in pitch (when said collar is loose) to the threads of the screw with which it engages.

Railway-Lantern

No. 688,021.

JOHN F. KING, of Baltimore, Maryland.

In railroading it often becomes necessary to warn the engineer of an approaching train, of trouble ahead or for numerous reasons to stop. At night lanterns and torpedoes are employed for this purpose. The torpedoes are adapted to be clamped to the rail over which the approaching train must pass, whereby when the same are mashed on the rail by the wheels of the train an explosion and loud report is made. Different signals may



thus be communicated to the engineer, according to the number of torpedoes placed on the rail. The torpedoes now in common use are provided with soft-metal clamping-arms which take on the sides of the rail and clamp the torpedo thereon, and often railroad men when carrying the torpedoes secure them to the wire frame of their lanterns by twisting the soft-metal arms around the frame-wires. This is objectionable, because thereby the clamping-arms are often broken and rendered useless and their unfitness for use is not discovered until the emergency arises.

My invention therefore relates to an improved construction whereby each torpedo may be carried in a separate receptacle to avoid injury to the torpedo and rattle.

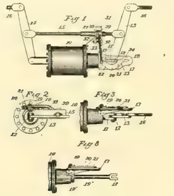
Slack-Adjuster for Brakes

No. 685,377.

SINCLAIR J. JOHNSON, of Nutley, New Jersey.

The combination, with a brake-cylinder and a piston member, of a rod hav-

ing a threaded portion and forming a part of the connection between the piston member and the brake mechanism; a threaded portion surrounding the same; means for rotating one of the threaded elements; a movable member adapted to



be intermittently operated during the travel of the piston member; and a connection therefrom to the rotating means.

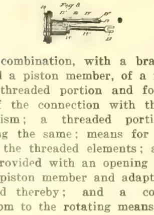
The combination, with a brake-cylinder and a piston member, of a rod having a threaded portion and forming a part of the connection between the piston member and the brake mechanism; a threaded portion surrounding the same; oscillating means for rotating one of the threaded elements; a movable member adapted to be intermittently operated during the travel of piston member; and a connection therefrom to the rotating means.

Slack-Adjuster for Brakes

No. 685,378.

SINCLAIR J. JOHNSON, of Nutley, New Jersey.

The combination, with a brake-cylinder and a piston member, of a rod having a threaded portion and forming a part of the connection with the brake mechanism; a threaded portion surrounding the same; means for rotating one of the threaded elements; a plate mounted to slide upon a relatively-fixed support adjacent to the piston member and adapted to be operated by said piston member; and a connection therefrom to the rotating means.



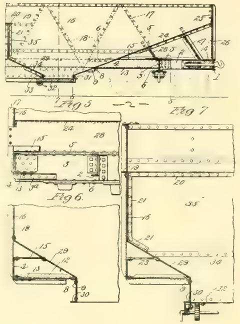
The combination, with a brake-cylinder and a piston member, of a rod having a threaded portion and forming a part of the connection with the brake mechanism; a threaded portion surrounding the same; means for rotating one of the threaded elements; a sliding plate provided with an opening adjacent to the piston member and adapted to be operated thereby; and a connection therefrom to the rotating means.

Hopper-Bottom Car

No. 688,019.

GEORGE I. KING, of Detroit, Michigan, assignor to American Car & Foundry Company, of St. Louis, Missouri, a corporation of New Jersey.

This invention relates to a new and useful improvement in hopper-bottom cars designed especially for use in hauling loose loads or material in granular form, the object being to provide a car with a bottom made up of inclined sheets to accelerate the discharge of the load, the exit-openings for the load being controlled by suitable doors.



Another object is to construct a car of the character described of structural or pressed steel, and in order to obtain maximum strength and rigidity with the least amount of dead-weight with respect to the carrying capacity of the car I utilize the side walls as plate girders, which plate-girders also help form what might be termed the "top chords of side trusses," the bottom chords of said trusses being preferably in the form of horizontally-arranged latticed girders supported at their ends by the body-bolsters of the car.

Another object is to take advantage of the arrangement and disposition of the hopper-floor sheets by utilizing said sheets to add strength and rigidity to the structure.

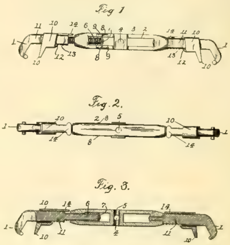
In an underframing for cars, the combination with the end sills, of body-bolsters, draft-sills extending between said end sills and body-bolsters, side sills, and plates riveted to the top and bottom flanges of said side sills and extending inwardly beyond the body bolsters.

Railway-Track Gage

No. 688,106.

BENJAMIN F. LYND, of Ironton, Ohio.

The invention relates to a device for accurately fixing the distance between the rails of railways, and has for its object to provide a novel means which will not only enable the user to read from the instrument the actual distance between the rails, but will serve as a convenient means for moving the rails in either direction to bring them to the desired position, the construction being such that the gage may be shifted instantly to engage



with the rail without the necessity of running in the screw through which power is utilized to move the rails.

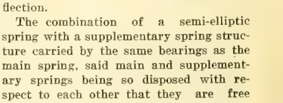
The claw 1 and knee 10 when brought into intimate engagement with opposite sides of a rail-tread can be utilized to turn the rail upon its supporting-base should it be lying on its side. The construction also affords a wider range of use for the implement in its use for gaging rails than can be obtained from gages as heretofore constructed, for obviously it is simply necessary to bring the claws and knees into engagement with opposite faces of the respective rails, when the rails can be adjusted back and forth until accurately fixed in the desired position.

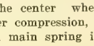
Reinforcing Device for Semi-Elliptic Springs

No. 687,692.

CHARLES LINDSTROM, of Bloomington, Illinois, assignor of one-half to Clarence M. Mendenhall, of Bloomington, Illinois.

The object of my invention is to provide an effective method of reinforcing semi-elliptic springs, so as to prevent





breakage of the same due to excessive deflection.

The combination of a semi-elliptic spring with a supplementary spring structure carried by the same bearings as the main spring, said main and supplementary springs being so disposed with respect to each other that they are free from contact at the center when the spring is not under compression, but in contact when said main spring is compressed.

The combination of a semi-elliptic spring with a supplementary spring structure and separating-blocks interposed between the ends of said main spring and the ends of the supplementary spring structure.

BOOKS REVIEWED

FIRST AID IN ACCIDENTS.

By CHARLES R. DICKSON, M.D. *Prepared for and endorsed by the International Association of Railway Surgeons. F. H. Revell Co., Publishers, Chicago.*

This little book of 124 pages has been prepared for the purpose of furthering the teaching of First Aid principles to railway employés and others. "It is obvious that every employé engaged in transportation service should know how to render help to the injured, whether passenger, fellow-employé or himself."

The first chapter contains some introductory remarks and deals with the rudiments of anatomy and physiology, the study of which should be a part of the training of every school boy, and part of the stock of knowledge possessed by the "man behind the throttle," and his fellow employés in all branches of railway service.

The Esmarch triangular bandage, we are told, although introduced by Mayor of Lausanne in 1832, did not become popular until its great advantages, in time of war, were shown by Surgeon-General Esmarch of the German army, who had pictures printed on it, illustrating the various methods of application. He supplied his troops with it in this form in 1869. It can be had in this form for use to-day.

Chapter II. opens with some pertinent remarks, the burden of which is that above all things, in surgical matters, cleanliness is indeed next to godliness. A curious two-fold fact has often been noticed by railway surgeons, and that is that no sooner is a man wounded in any way on a railway than his fellow employés desire to render aid, and that acting on this desire, there is nevertheless no substance too filthy to be used as a dressing for a wound. Black oil, dusty and germ laden cobwebs or "chews" of tobacco, all being favorites. The point our author rightly insists upon is that a trivial wound may be made most serious by uninstructed efforts to aid. This natural desire to help, which like Hope, "springs eternal in the human breast," is a noble impulse, and it is gratifying to find how much is being done by those in authority to stimulate and help those under them toward the possession of such elementary knowledge of First Aid methods, as will produce some real and tangible good for the victims of accident.

The important subject of hemorrhage is dealt with and the way to stop bleeding is explained. It is not hard to learn, but it may mean the saving of a precious human life, by a man who knows how.

Chapter III. is concerned with sprains, dislocations, fractures, and wounds. We have had occasion to say before now that we do not believe that a good working knowledge of First Aid methods is any more, if as difficult to acquire as that required to become proficient in the air-brake matters, so that no railroad man need fear to try.

Chapter IV. is on Insensibility and the methods of restoring consciousness. Under this head instructions are given which are of vital importance for the reason that the rescues cannot, from the nature of the case, receive any assistance from the sufferer. The method of restoring persons apparently drowned is given; the procedure is applicable to any victim of accident when artificial respiration is required, and we desire to say that strange as it may appear, a person struck down by lightning or stricken by dynamic electricity in any form should not be given up as dead until every effort to resuscitate him, has been resorted to just as if he had been apparently drowned. All sorts of accidents where the patient is helpless are here dealt with, and the man who wants to help in time of distress will find his ability to do so very much enhanced by a study of simple common sense, adequate First Aid methods as here set forth.

Chapter V., followed by an index, deals with methods of lifting, carrying and conveying the sick and injured and how to prepare a room to receive them.

Dr. Dickson is to be congratulated on his work, and we hope that the appearance of this book will lead to still greater interest being taken in the most important subject of First Aid in accidents. The International Association of Railway Surgeons is also to be congratulated on having had published under its authority an up-to-date handbook, which we should like to see as part of the "kit" of every train crew in the country.

FREIGHT REPAIRS.

By F. J. Krueger. Price 60c.

"Freight Repairs" is a standard sized pamphlet of 80 pages by Mr. F. J. Krueger, and is a most useful reference book for car department officials, foremen, car inspectors, clerks and others. The object of the book is to furnish a ready reference for freight car work, for all those making repairs to foreign cars, ordering material and checking up bills. Considerable space is devoted to airbrake repairs; the symptoms of disease, and the remedies to be applied are stated concisely. That ought to touch the man in the yard. The parts are represented in numbered diagrams with names given below of both Westinghouse and New York systems.

A most useful table of average number of hours of labor commonly used in making repairs, appears on page 28. The labor charges, however, are not intended as official authority for charging, but are quoted as being a fair average of actual time required to do various kinds of work and therein lies the greatest value of the table. The table which follows, giving weights of material, is of service in checking up repair bills. The table of weights of metal, brake beams and parts gives the actual weight of parts in columns indicating whether each is made of malleable or wrought iron or steel. The table is followed by an illustrated chart whereby, even if the name be not known by a car inspector, he can easily identify it. The principal makes of couplers, some thirty in all, are treated in like manner to the metal brake beams. A knuckle chart, published by authority of the *Sargent Company* gives 96 varieties in outline, with names and weights of each. The knuckle-lock chart gives 51 half tones of these devices with names contained in a table making identification easy. Tables are appended giving weights of bolts, flat bar iron, round iron, square iron, and nails, both steel-cut, and wire. The book concludes with diagrams of draw gear and coupler attachments, some miscellaneous articles and the addresses of manufacturers of car supplies together with an index. Mr. Krueger's admirable little "handy help" may be had by applying to the author.

VARNISHES AND FOSSIL RESINS.

Messrs. Pratt and Lambert, varnish makers of New York and Chicago, have handed to their customers and friends a most useful, interesting and beautifully printed pamphlet, being *A Few Notes on Varnishes and Fossil Resins*, by R. Ingham Clark, F. L. S., F. R. G. S., illustrated by James West and published by Charles Letts & Co., Royal Exchange, London. Part I is devoted to varnish. Its history from very ancient times is given up to the present time. The subject is treated from the chemical and the practical standpoint, as well as from the historic and the artistic. The famous varnish used by the world-famous violin makers of Cremona, it seems, has been successfully imitated, though the process by which the modern substitute is made is not unattended with danger. If ever there was supposed to be a lost art, the making of Cremona varnish was one.

Part II deals with Resins. Among which are mentioned, with many notes and illustrations Amber, Animis, Copals, Kauri Gum Damar, and Mastic, together with all the geographically modified varieties of these. Messrs. Pratt and Lambert have picked out a most attractive souvenir, and one which will no doubt be appreciated by every one into whose hands it falls. It is a high class thing of its kind.

BALDWIN RECORD OF RECENT CONSTRUCTION NO. 30.

The record of construction which has just been issued by the Baldwin Locomotive Works is one of considerable interest, being a reprint of what may be called a lecture, illustrated when delivered, with stereopticon views, by Mr. S. M. Vauclain, superintendent of the Baldwin Locomotive Works. The pamphlet is printed to conform in style with the series which this concern gets out from time to time. Opposite page 12 is an ingenious representation of the main valve of a Vauclain compound engine, showing steam passages, valve-bushing and valve. A movable slip of paper carries a diagram of the valve, which can be adjusted so as to place the valve in any desired position, and thus show the pathway for the steam as it comes from the front end of the high pressure cylinder and enters the back end of the low pressure cylinder, or vice versa.

A table of Fuel Economy effected by the Baldwin compound on ten railways is given, the highest being 44.9 per cent., and the lowest, 26 per cent. The paper throughout is illustrated by neatly executed halftones, diagrams and tables. The full page halftone opposite the title page represents the trial of a compound locomotive—Baldwin type—on the Chinese Eastern Ry., in which picturesque Celestials are grouped about the American monster.

Record of New Equipment

Ordered during the Month of December, 1901

CARS

Ordered by.	No.	Class.	Building.
A. T. & S. F.	3000	Box.	Am. Car & F. Co.
A. T. & S. F.	1000	Refr.	Pullman Co.
A. T. & S. F.	33	Coaches.	Pullman Co.
A. T. & S. F.	17	Chair.	Pullman Co.
A. T. & S. F.	300	Flat.	Am. Car & F. Co.
B. & O.	3000	Hopper.	Am. Car & F. Co.
B. & O.	11	Express.	Pullman Co.
Boston & Maine	200	Coal.	Laconia Car Co.
Buf. Roch. & Pitts.	500	Hopper.	Am. Car & F. Co.
Cent. of N. J.	1000	Box.	Am. Car & F. Co.
Cent. of N. J.	20	Coaches.	Am. Car & F. Co.
Cent. of N. J.	30	Coaches.	Harlan & Holl'gsw'th.
Cent. of N. J.	750	Hopper.	Am. Car & F. Co.
Cent. of N. J.	500	Gond'la.	Am. Car & F. Co.
Ches. & Ohio	100	Box.	Pullman Co.
Chic. Gr. Western	16	Pass.	Pullman Co.
Chic. Gr. Western	20	Cabooses.	Am. Car & F. Co.
Chic. Gr. Western	3000	Frt.	Haskell & Barker.
Chi. R. I. & Pac.	700	Box.	Pullman Co.
Chi. R. I. & Pac.	300	Refr.	Am. Car & F. Co.
Colo. & Sou.	400	Frt.	Am. Car & F. Co.
D. L. & W.	1000	Coal.	Pressed Steel Car Co.
D. L. & W.	1000	Box.	Am. Car & F. Co.
Denver & R. G.	20	Coaches.	Am. Car & F. Co.
El Paso & N'west'n.	10	8-w Caboose	Am. Car & F. Co.
Gr. Northern	42	Pass.	Barney & Smith Co.
Ill. Cent.	1500	Box.	Pullman Co.
Ind., Ill. & Ia.	6	Cabooses.	Am. Car & F. Co.
Man. El. (N. Y. C.).	200	Pass.	Wason Car Mfg. Co.
Mexican Cent.	2	Tank.	Am. Car & F. Co.
M., S. P. & Ste. M.	200	Flat.	Am. Car & F. Co.
Mo. Pac.	500	Coal.	Am. Car & F. Co.
Mo. Pac.	1000	Stock.	Am. Car & F. Co.
N. Y. C. & H. R. R.	700	Box.	Pullman Co.
N. Y. Chi. & St. L.	1000	Box.	Am. Car & F. Co.
N. Y. Ont. & W.	500	Coal.	Am. Car & F. Co.
Nor. Pac.	300	Ballast.	Am. Car & F. Co.
N. & W.	500	Box.	Roanoke Mach. Wks.
N. & W.	500	Coal.	Roanoke Mach. Wks.
N. & W.	250	Stock.	Roanoke Mach. Wks.
Penna. R. R.	500	Gondola.	Ill. Car & Equip. Co.
Penna. R. R.	775	Box.	Ill. Car & Equip. Co.
Pere Marquette	506	Box.	Am. Car & F. Co.
Pere Marquette	200	Gondola.	Am. Car & F. Co.
Phila. & Reading	1150	Coal.	Am. Car & F. Co.
Phila. & Reading	1000	Box.	Am. Car & F. Co.
Phila. & Reading	500	Hopper.	Cambria Steel Co.
Phila. & Reading	200	Hopper.	Middletown Car Wks.
Phila. & Reading	200	Coal.	Leban Mfg. Co.
Rutland	75	Ballast.	Rodgers B. C. C.
St. Louis Valley	40	Ballast.	Rodgers B. C. C.
Seab'd Air Line	500	Box.	Am. Car & F. Co.
Sou. Miss. & Ark.	500	Coal.	Am. Car & F. Co.
Sou. Miss. & Ark.	25	Flat.	Mt. Vernon C. M. Co.
Sou. Pac.	18	Dining.	Pullman Co.
Sou. Pac.	100	Dump.	Am. Car & F. Co.
Sou. Pac.	300	Side Dump.	Am. Car & F. Co.
To., St. L. & W.	50	Box.	Am. Car & F. Co.

OBITUARY

The late Mr. Joseph Pomeroy was born in London, England, in 1849. He died at his home in Mount Vernon, N. Y., in the fifty-second year of his age. He was connected with the paint and color business since 1873, when in his native land, he entered the employ of the old firm of Nobles & Hoare. Being an accomplished linquist he visited in their interest most of the European countries, also the United States, Canada, South America and the West Indies. In 1886 he formed a partnership with Mr. Frederick Fisher, and the firm was intrusted with the sole agency in the United States, of Nobles & Hoare's English varnishes, besides which the firm carried on an importing business on its own account.

Mr. Pomeroy married in 1887 the sister of Mr. Fisher, and the families of both partners have ever since been affectionately united. The deceased leaves a widow and little daughter. Mr. Pomeroy's success with railroad companies and railroad officials was marked, and the firm is well and widely known.

LOCOMOTIVES

Ordered by.	No.	Class.	Building.
B. & O.	48	Locos.	Am. Loco. Co.
Cent. of N. J.	60	Locos.	Am. Loco. Co.
Chi., Bur. & Q.	50	Locos.	Baldwin Loco. Works.
Choctaw, Ok. & G.	50	Locos.	Baldwin Loco. Works.
Cin., N. O. & T. P.	32	Locos.	Baldwin Loco. Works.
Colo. & Sou.	15	Cons'l'n.	Am. Loco. Co.
Ill. Cent.	34	Locos.	Rogers Loco. Works.
Lehigh Valley	40	Locos.	Baldwin Loco. Works.
Louis & Nash.	15	Cons'l'n.	Rogers Loco. Works.
Mexican Cent.	15	Cons'l'n.	Am. Loco. Co.
Mich. Cent.	10	Locos.	Am. Loco. Co.
Mo., Kans. & Tex.	23	Locos.	Baldwin Loco. Works.
Nor. Pac.	50	Locos.	Baldwin Loco. Works.
Nor. Pac.	50	Locos.	Am. Loco. Co.

Supply Trade Notes

The Central Railroad of New Jersey will issue this week a descriptive illustrated booklet on Lakewood, setting forth its attractions in a befitting manner.

The booklet is from the press of one of the best printing houses in New York, and it is really a work of art. The title of this brochure is simply Lakewood, and upon application to the General Passenger Department of the New Jersey Central, New York City, by letter, it will be sent you free.

The increasing business of the Prospectus Company has made it necessary to open an office in New York City. Mr. Manton E. Parker and Mr. M. A. Robinson have been appointed sales agents and representatives in this district. The company's friends and customers will find a cordial welcome in the new office in the Aldrich Court Building, 45 Broadway, New York City.

An application for a charter for the Standard Steel Car Co. has been made in Pennsylvania with a capital stock of $2,000,000. J. M. Hansen, formerly chief engineer of the Pressed Steel Car Co., is one of the incorporators and will be president of the new company. The other incorporators named are H. J. Gearhart, for some time auditor of the Pressed Steel Car Co., and recently manager, and Peter F. McCool. Several sites for a plant are under consideration. It will probably be located in the Pittsburg district and be ready for operation by July, 1902.

Messrs. Browne & Frothingham, 32 Broadway, New York, announce that they have opened a department for the export of machine tools. This department will be under the supervision of Mr. A. M. Fisher, who has just returned to New York after three years spent in Japan where his entire attention was devoted to this branch of engineering. This firm solicits catalogues and prices together with shipping weights and measurements from the machine tool builders.

Traffic Manager Caldwell, of the Lackawanna, has undertaken to protect the patrons of that road against delays from car shortage by ordering that until further notice Lackawanna cars will not be loaded for points off that system without special permission. All cars on sidings will be retained on the road.

The American Brake Shoe Company, of Chicago, have issued a neat little paper weight, in the form of a handsome bronze medal upon which is recorded the successes which the company has scored, having received first awards in all exhibits in Chicago 1884, Chicago 1893, and Paris 1900. The obverse contains small reproduction of the medals awarded at these exhibitions, the margin is surrendered by representations of the Sargent brake shoe. The reverse has the name of the company in the margin, and the center is occupied with an enumeration of the licenses which the company holds; these are the Sargent Co., the Ramapo Foundry Co., the American Steel Casting Co., the Ross Meehan Foundry Co., Parker and Topping and the Eureka Foundry Co. We have no doubt that the American brake shoe medal will be received as a mark of distinction by those to whom it may be sent.